NATUR CYMRU
Nature of Wales

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- Dinosaur discovery
- Pollinators
- Malltraeth Marsh
- Glow-worms
- Blue Ground Beetle
- Seagrasses
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Long-horned bee
Eucera longicornis
Gwenynen gorniog

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GOLYGYDDOL EDITORIAL

Filoedd o flynyddoedd yn ôl, pan oedd y syniad o olau artiffisial yn ddim mwy nag egin syniad yn llygad rhyw rywogaeth anesblygedig, rhoddodd dinosor bychan ei anadl olaf ar lan yn ne Cymru gan roi'r gorau i unrhyw obaith o fod yn enwog. Ar ôl miliynau o flynyddoedd, daeth i'r fei unwaith eto yn dilyn cwymp creigiau pan ddaeth helwyr ffosil gweithgar o hyd iddo ar hap a damwain. Roedd hon yn rhywogaeth newydd nid yn unig i Gymru, ond hefyd i'r byd. Mae'n bleser gennym gyflwyno adroddiad ar arddangosyn diweddaraf Amgueddfa Cymru.

Mae thema 'anweledig' gref i'r cyhoeddiad hwn. Mae rhai rhywogaethau, gwaetha'r modd, yn anweledig gan eu bod yn prinhau. Ble mae'r gwenyn, y gwyfynod a'r peillwyr eraill oedd gynt yn ffynnu yng Nghymru? Maent yn diflannu, ynghyd â'r blodau gwyllt a'r 'chwyn'. Mae angen ymdrech ar y cyd gan bob un ohonom os ydym am rwystro' r rhywogaethau cyd-ddibynnol hyn rhag diflannu'n llwyr.

Ar nodyn hapusach, mae rhai rhywogaethau yn dewis aros ynghudd. Mae cyrs a brwyn cors adferedig Malltraeth yn cuddio nifer o adar ac infertebratau, a gwelyau glaswellt y môr, sy'n cuddio dan y tonnau, yn meithrin heigiau o bysgod, er bod y rhain hefyd mewn perygl o ddirywio. Mae rheswm pan fo angen tywyllwch ar greaduriaid nosol: ni all magïod dywynnu a denu cymar liw dydd ac mae Chwilen Las y Llawr sy'n newydd i Gymru, wedi cuddio rhag y llygad dynol, o bosib am ganrifoedd, drwy hela ei hysglyfaeth yn y nos. Mae sawl mamal yn weithgar yn y tywyllwch a rhaid defnyddio camerâu arbennig i'w ffilmio a dysgu beth maent yn ei wneud, ond mae'n werth gwneud hynny. Mae tywyllwch yn hanfodol i'r rhywogaethau hyn, ac mae Awdurdod Parc Cenedlaethol Eryri wedi gwneud cais am statws Gwarchodfa Awyr Dywyll ac wedi ymgyrchu i leihau llygredd golau diangen.

Yn olaf, os oes unrhyw un yn teimlo fod y rhifyn hwn yn cynnwys mymryn gormod o newyddion o Ogledd Cymru, hoffwn eich sicrhau y byddwn yn rhoi mwy o sylw i'r Canolbarth a'r De yn y cyhoeddiadau nesaf!

Many millennia ago, when the thought of artificial light was no more than a gleam in a gleam in a gleam in some unevolved species' eye, a small dinosaur breathed its last on a south Wales shore and gave up all hopes of ever being famous. Unseen for millions of years, it came back to the light of day following a rockfall and a chance encounter with diligent fossil hunters, and proved to be a new species not just for Wales but for the world. We are pleased to report on the National Museum Wales' latest exhibit.

There's a bit of an 'unseen' theme to this issue. Some species, alas, are unseen because they are becoming increasingly rare. Where are the bees, moths and other pollinators which once flourished in Wales? Disappearing, along with the wild flowers and 'weeds'. Concerted effort is needed from all of us if these mutually dependent species are not to vanish completely.

On a happier note, some species remain hidden by choice. Reeds and rushes of the restored Malltraeth Marsh hide numerous birds and invertebrates, and seagrass beds, hidden beneath the waves, foster nursery shoals of fish. Nocturnal creatures need darkness for a reason: glow-worms can't glow and attract mates in the daytime and the new-for-Wales Blue Ground Beetle has remained hidden from human eyes, possibly for centuries, by hunting its prey at night. Many mammals are active in darkness and it takes special cameras to film them and find out what they're up to, but the effort is worth it. Darkness is essential for these species, and Snowdonia National Park Authority has applied for International Dark Sky Reserve status, with an active campaign to cut unnecessary light pollution.

Lastly, if anyone feels there's a slight north Wales bias to this issue, rest assured we aim to bring mid and south Wales out of hiding in issues to come!

Mandy Marsh

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The prospects for wild pollinators in Wales - how are we doing?

Shrill Carder Bee *Bombus sylvarum* Cardwenynen Feinllais (queen)

The continued decline of wild pollinators such as solitary bees, bumblebees and hoverflies has generated public concern and political action. Can we expect these initiatives to bear fruit, and the decline to be halted, or is there still more to do? MIKE HOWE considers the outlook.

Concerns over the declines of wild pollinator and honey bee populations have resulted in a plethora of action plans and initiatives to address the causes. In order to work and reverse wild pollinator declines, they need to restore diverse and connected flower-rich habitats from April to October.

The Welsh Government published *The Action Plan for Pollinators* in 2013[1], which lists four outcomes aimed at improving the situation for pollinators:

- Wales has linked policy, governance and a sound evidence base for action for pollinators;
- Wales provides diverse and connected flower-rich habitats to support pollinators;
- Wales' pollinator populations are healthy;
- Wales' citizens are better informed and aware of the importance and management of pollinators.

Evidence for wild pollinator declines

Over 1500 wild pollinator species occur in the UK[2], including bumblebees, solitary bees, moths and butterflies, hoverflies, other fly families and beetles. Population declines of 60% and more have been recorded for butterflies and moths in many habitats, and the picture is likely to be the same for other pollinator groups. The *State of Nature* report[3] highlights the declines of invertebrate species in relation to habitats (see Fig. 1), a proportion of which will include pollinator species.

© Natural History Museum

Great Yellow Bumblebee *Bombus distinguendus* Gacynen Fawr Felen (pinned queen, 1924)

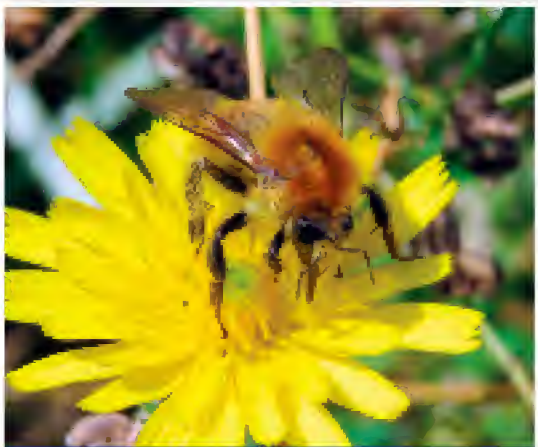
Figure 1. Summary of UK declines experienced by selected pollinator groups.

Taxonomic Group	Decline
Butterflies[3,4]	72% of species declined in abundance between 2000 and 2010. 54% of species declined in distribution. 50% of species show a strong (25%) or slight decline.
Moths[3,5]	60% of 676 species show a strong (50%) or slight decline. 67% of 337 widespread species show a significant decline, with 37% declining by more than 50%. 66 species extinct in the UK since the start of 20th century.
Hoverflies[6]	33% of 257 species show a significant decline.
Bumblebees[7]	50% of 27 bumblebee species in decline. 3 species already gone extinct. 7 species declined by more than 50% in the last 25 years.
Solitary Bees[3]	50% of 178 species show a strong (25%) or slight decline.
Wasps[3]	60% of 175 species show a strong (25%) or slight decline.
Ground Beetles[3]	72% of 68 species show a strong (25%) or slight decline.

Pollinator losses in Wales

Bumblebees and solitary bees are amongst the most important plant pollinators, both economically and for wild flower seed production and survival. Since the 1950s two species of bumblebee have become extinct in Wales. Once widespread throughout the UK, the Great Yellow Bumblebee *Bombus distinguendus* is now restricted to northern Scotland and its islands, where it is mostly associated with extensive areas of flower-rich machair. It was last recorded in Wales at Leckwith in Cardiff in 1974. The Short-haired Bumblebee *Bombus subterraneus* occurred throughout southern Britain but was last seen in the UK at Dungeness in Kent in 1988[8]. It has since been the subject of a re-introduction programme to Dungeness, with 100 queens collected from Sweden released between 2012 and 2013. It was last recorded in Wales at Penarth, Glamorgan in 1956 and Ceredigion in 1970.

The Shrill Carder Bee *Bombus sylvarum* and the Brown-banded Carder Bee *Bombus humilis* are both included in the Section 42 list of species of principal importance in Wales. Both species have suffered major contractions in range in the UK, and this has been mirrored in Wales. The Shrill Carder Bee is now confined to three areas on the south Wales coast, although populations on Castlemartin Range and the



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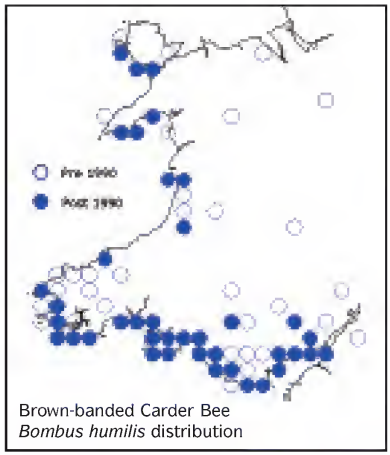
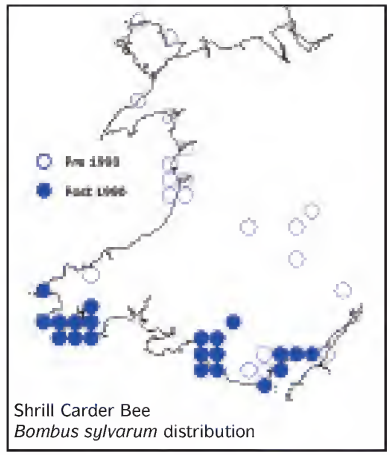
Brown-banded Carder Bee *Bombus humilis* (worker)



Brown-banded Carder Bee
Bombus humilis distribution



Shrill Carder Bee
Bombus sylvarum distribution

Gwent Levels are very robust. The Brown-banded Carder Bee is still widespread on the Welsh coast but almost all inland populations have been lost. It is not just bumblebees experiencing these declines. The exquisite Long-horned Bee *Eucera longicornis* has similarly retreated to mostly coastal localities in recent years.

Habitat and floral declines

We are all too familiar with the huge declines in wildlife habitats since the 1940s but the statistics included in the *State of Nature* report still have the ability to shock. It reports losses of:

- 97% of flower-rich lowland meadows in England and Wales between the 1930s and 1984 – a total loss of 64,000 sq km;
- 90% of the area of coppiced woodland from 1900 to 1970;
- 80% of lowland heathland in the UK since the 1800s;
- 94% of lowland raised mires between 1800 and 1978, with most of those remaining having been damaged.

At the same time wild plants are declining, with ten vascular plant species becoming extinct in the UK since the 1950s[9]. At a county level, wild flowers are being lost at a rate of up to nearly one species per year per county, and the rate of loss is accelerating. A sharp decline in the abundance of hitherto common or frequent wild flower species must be affecting their mutually dependent pollinators.

The need for wild pollinators

The Action Plan for Pollinators states that the value of pollinators to UK agriculture is estimated to be worth at least £430 million per annum. It has been calculated that there are only enough honeybee hives in the UK to pollinate a third of crops, and that the main pollinators are wild insects[10]. Wild pollinators are less critical to Welsh farming than to agriculture elsewhere in the UK, because most of the 1.7 million hectares of farmland in Wales supports livestock farming, with less than 10,000ha being devoted to soft fruit, orchards and horticultural crops which may require pollinators.

So, does Wales need to ensure that there are healthy pollinator populations? Future farming practices may have to adapt to climate changes and global human population expansion, and a more mixed farming approach may necessitate the presence of wild pollinators within agricultural landscapes, given the role they play in pollinating some key crops. However, poor soils dictate that farming will remain dominated by meat production. Safeguarding wild pollinator populations is arguably much more critical, at least in Wales, because of their role in pollinating wild plants. Vanbergen & Dicks[11] calculate that 75% of flowering plant species in temperate regions require insect pollination to develop their fruits and seeds fully. Some of the plant losses witnessed in the UK may be the result of declining pollinator populations.

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Red Bartsia *Odontites vernus* Gorudd, is a favourite food plant of Shrill Carder Bee workers.

© Steven Falk

Brown-banded Carder Bee *Bombus humilis* Cardwenynen Brown Rhesog (queen)

Recovering wild pollinator populations

To achieve the Welsh Government's vision and arrest and reverse wild pollinator declines, significant efforts have to be made to increase the availability of flower-rich habitats across farmland, countryside and urban landscapes. Outcome 2 of the Wales Action Plan, that Wales provides diverse and connected flower-rich habitats to support our pollinators, is critical to any delivery. It states that *"beneficial flower rich habitats are promoted, created and enhanced wherever possible across Wales, at landscape scale, and also at smaller scales"* and that *"opportunities for habitat creation and enhancement for pollinators are promoted and supported on farmland, across protected areas and the wider countryside, and in urban and developed areas"*. It identifies three actions and associated activities that are essential in order to secure the outcome in the short term (Table 1).

Various initiatives developed under the auspices of the Welsh Pollinator Taskforce have provided a focus on sympathetic management of urban areas and roadside verges. This has culminated in the Welsh Government Nature Fund awarding £130,000 to Keep Wales Tidy *"to maximise multiple ecosystem services of currently undervalued green sterile spaces – mowed areas on industrial estates, school and hospital grounds, business parks and roadside verges and transform them into a blaze of wildflowers"* and £282,100 to Torfaen County Borough Council *"to undertake a range of initiatives to promote long term sustainable land management and to improve habitats and conditions for all pollinating species across the South Wales Valleys"* in autumn 2014.

Table 1. Actions and activities required to secure Outcome 2 of the Wales Pollinator Action Plan[1]

Action 2.1 Promoting, creating and enhancing diverse and connected flowering habitats across farmland.

- Consider how Glastir can improve outcomes for biodiversity and pollinators.
- Inclusion, where feasible, of biodiversity outcomes within the Common Agricultural Policy (CAP) reform process and the development of the next RDP.
- Linking outcomes for pollinators with Welsh Government (WG) work on Payments for Ecosystem Services (PES).
- Raising awareness of best practice with farmers and land managers through Farming Connect, and dissemination of best practice guidance.

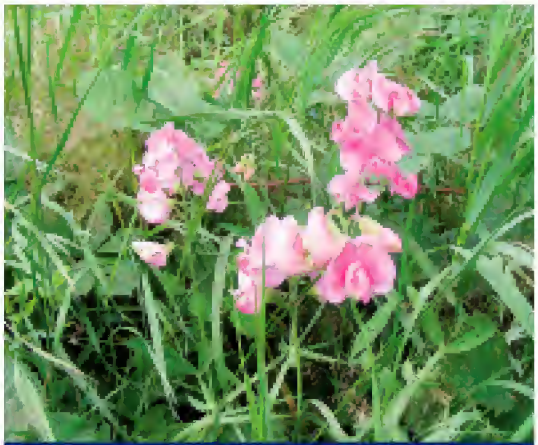
Action 2.2 Promoting, creating and enhancing diverse and connected flowering habitats across protected areas and the wider countryside.

- Work with NRW to ensure action for pollinators on designated sites, and within the woodland estate.
- Ensure National Park and AONB outcomes and indicators include biodiversity and pollinators.
- Review key regulations and designations which impact on pollinators to ensure they are fit for purpose.

Action 2.3 Promoting, creating and enhancing diverse and connected flowering habitats in our towns, cities and developed areas.

- Instigate an Urban Pollinators Initiative for Wales as part of the Pollinators work programme.
- Review Local Authority management of roadside verges, parks and public green spaces.
- Promote community-led projects to benefit pollinators and local communities through current annual funding streams such as *Tidy Towns and Tranquil, Cleaner and Greener Places*, and with partners: Keep Wales Tidy, local authorities and communities.
- Incorporate pollinator-friendly practice within WG landscaping and commercial property management contracts.
- Include pollinator guidance within the review of sustainable housing policy.
- Contribute to any review of WG transport guidance and policies and the Trunk Road Estate Biodiversity Action Plan with guidance for management for pollinators.

There has been far less progress with the farmed environment and wider countryside landscapes. Whilst there are pollinator-friendly options in Glastir[12,13], such as the establishment of red clover leys and some of the prescriptions for pastures and



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Queens of Brown-banded carder Bee and Shrill Carder Bee forage heavily on Broad-leaved Everlasting-pea (*Lathyrus latifolius* ytbysen fythol lydanddail)

hay meadows, these could be improved and better targeted. For example, the current cutting date of 15th July is very early for many pollinators and has the potential to remove most of the available forage over large areas of the countryside at a critical time for species such as bumblebees. Late summer and early autumn witnesses the emergence of new queens which need an abundance of forage to build up reserves required to over-winter successfully. A more flexible approach, with later or staggered dates, would be much more beneficial. Other improvements would include a greater focus on sward composition as well as structure within the grassland prescriptions, and geographically targeted actions aimed at key declining pollinators such as the Shrill Carder Bee and Brown-banded Carder Bee or at crops requiring wild pollinators. The current prescriptions for hay meadows and meadow reversions specify that 5-10% should be left uncut. This may fall short of recent recommendations, although it should be noted that to avoid uncut areas becoming rank, they should be managed on rotation. The Welsh Government Glastir Review in 2014 did address the potentially damaging use of organic and inorganic fertilisers on flower-rich grasslands, but did not change cutting dates or other relevant prescriptions.

Recent research has highlighted the benefits to wild pollinators (bees) of providing a 10-20% flower-rich landscape within a Swiss agri-environment scheme[14].

Perhaps we should adopt similar targets for the Welsh countryside. This need not be focussed entirely on agricultural land, as nature reserves, SSSIs and other areas protected for wildlife, if managed sympathetically, will help to realise this ambition. Hedgerows and road verges could also make a significant contribution towards the target, and provide connectivity and dispersal routes for pollinators in an otherwise fragmented landscape. Blackthorn, hawthorn and sallow are particularly important for pollinators emerging in the spring, when forage is often at a premium, and hedgerow cutting regimes should attempt to maximise the blossoming of these species. Road verges in Wales occupy 11,350ha, the combined size of Cardiff and Swansea, and therefore have the capacity to make a sizeable contribution towards the target, provided that they are managed sympathetically. Such management would include more sensitive cutting regimes, the use of low-fertility substrates in verge construction, the removal of cut material and the planting of native species[15,16]. Of course, road verges are not necessarily the most suitable places for pollinators, given the inherent risks of collision with vehicles and pollution from exhausts, but they certainly have the capacity to provide flower-rich oases in otherwise barren landscapes, and connectivity to other flower-rich habitats.

In summary, there is strong evidence that wild pollinator species have declined in Wales, with some species becoming extinct, and the most likely causes of declines are habitat loss and fragmentation. Many pollinators are reliant on extensive areas of flower-rich habitat from April to October and these are at a premium. Much of the current focus on restoring wild pollinator populations is because of the services they provide to agriculture, but the pastoral systems predominant in Wales are not reliant on pollination. Wild pollinators are however critical to the pollination of wild plants, providing ample justification for safeguarding their status. Whilst on-going initiatives for roadside verges and urban areas will contribute towards the overall aim of improved pollinator populations and the provision of flower-rich landscapes, the critical factor is the more sympathetic management of farmland and the wider countryside, and greater efforts are required here.

Mike Howe *has been Invertebrate Ecologist at NRW, and previously CCW, since 1996. To date, he has focussed mostly on coastal habitats and on Diptera, Hymenoptera and Hemiptera but, with the recent retirement of Adrian Fowles, he now deals with all aspects of terrestrial and freshwater invertebrate conservation.*

References

1. Welsh Government. 2013a. *The Action Plan for Pollinators*. 23pp.
2. Department for Environment Food & Rural Affairs (Defra). 2014. *The National Pollinator Strategy: for bees and other pollinators in England*. 36pp.
3. Burns. F, Eaton, M.A. Gregory, R.D. et al. 2013. *State of Nature report*. The State of Nature partnership.
4. Fox, R., Brereton, T.M., Asher, J., Botham, M.S., Middlebrook, I., Roy, D.B. & Warren, M.S. 2011. *The State of the UK's Butterflies 2011*. Butterfly Conservation and the Centre for Ecology & Hydrology, Wareham, Dorset.
5. Butterfly Conservation. 2013. *The State of Britain's Larger Moths*. Butterfly Conservation, Wareham, Dorset.
6. Ball, S., Morris, R., Rotheray, G. & Watt. K. 2011. *Atlas of the Hoverflies of Great Britain (Diptera, Syrphidae)*. BRC & NERC.
7. Buglife www.buglife.org.uk
8. Edwards, M. 2002. *Bombus subterraneus*. In: Edwards, R. & Telfer, M. *Provisional atlas of the aculeate Hymenoptera of Britain and Ireland. Part 4*. Huntingdon: Biological Records Centre.
9. Plantlife. 2012. *Our Vanishing Flora. How wild flowers are disappearing across Britain.*
10. Breeze, T.D., Bailey, A.P., Balcombe, K.G., Potts, S.G. 2011. *Pollination services in the UK: how important are honeybees?* Agriculture, Ecosystems and Environment 142: 137– 143.
11. Vanbergen, A. & Dicks, L. 2014. *What is causing the decline in pollinating insects?*
12. Welsh Government. 2013b. *Glastir Entry Booklet 2: Technical Guidance 2015*.
13. Welsh Government. 2014b. *Glastir Advanced Rules Booklet 2: Whole Farm Code and Management Options*. Wales Rural Development Programme 2014-2020.
14. Buri, P., Humbert, J-Y. & Arlettaz, R. 2014. Promoting pollinating insects in intensive agricultural matrices: field-scale experimental manipulation of hay-meadow mowing regimes and its effects on bees. *Plos One*, 9: 1-8.
15. Howe, M.A. 2014. *Pollinators and Road Verges in Wales*. http://www.biodiversitywales.org.uk/24/en-GB/Wales-Action-Plan-for-Pollinators
16. Smith, S. 2014. *The flora of roadside verges in Wales. How important are Wales' road verges for plants?* http://www.biodiversitywales.org.uk/24/en-GB/Wales-Action-Plan-for-Pollinators

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Short-haired Bumblebee *Bombus subterraneus* (worker)

Cynlluniau ar gyfer peillio

Amcangyfrifir fod gwasanaethau peillio yn y DU yn werth £430 miliwn y flwyddyn, gyda thraean yn cael eu cyflenwi gan gychod gwenyn mêl a dwy ran o dair yn dibynnu ar wenyn gwyllt a thrychfilod peillio eraill. Mae dros 1500 o rywogaethau o beillwyr gwyllt yn y DU, yn cynnwys ieir bach yr haf a gwyfynnod, ac mae nifer o'r rhain yn dirywio'n gyflym, gyda rhai rhywogaethau bellach wedi darfod yng Nghymru: e.e., y tro diwethaf y cofnodwyd y Gacynen Flew Byr *Bombus subterraneusi*, yng Nghymru oedd yn 1970.

Mae gwenyn eraill yn bresennol ar hyd arfordir de Cymru yn unig lle mae'r tywydd yn fwynach. Mae'r ystadegau ar golli cynefinoedd bywyd gwyllt ers yr 1940au yn frawychus, gyda nifer o rywogaethau blodau gwyllt mewn perygl hefyd. Heb ddigon o baill, bydd y trychfilod yn dioddef: heb beillio, bydd y planhigion yn dioddef. Mae'n sefyllfa o gyd-ddibyniaeth a fydd ddim ond yn gwaethygu heb ymdrech bendant i adfer cynefinoedd amrywiol, cyfoethog mewn blodau. Mae *Cynllun Gweithredu* ar gyfer *Pryfed Peillio* Llywodraeth Cymru (2013) yn amlinellu cynlluniau i wella'r sefyllfa hon.

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Ymgyrch Gweld Sêr

Uwchben y Rhinogau, Mawrth 2015 / Above the Rhinogau, March 2015

Mae'r mwyafrif ohonom yn gyfarwydd a'r term 'llygredd'. Ond mae'n siwr ein bod ni'n dueddol o'i gysylltu'n bennaf gyda llygredd aer o ganlyniad i effeithiau nwyon diangen ar yr atmosffer, neu gyda llygredd dŵr a achosir gan gemegolion neu arllwysiad olew. Yn yr erthygl hon mae* GETHIN DAVIES *yn trafod math llai cyfarwydd o lygredd sydd ar gynnydd drwy'r byd, sef llygredd golau.

Diffinir llygredd golau fel *sglein aflonyddgar o'r awyr o ganlyniad i olau artiffisial gormodol, wedi ei gamgyfeirio neu ymwthiol.* Mae'n peri problem am nifer o resymau. Yn gyntaf, mae nifer o effeithiau ar iechyd dynol wedi cael eu priodoli i oleuadau artiffisial a llygredd golau, gan gynnwys amddifadedd cwsg a all yn ei dro achosi straen, a chynnydd yn y risg o ganser am fod y lefelau o felatonin sy'n cael ei gynhyrchu yn lleihau[1]. Gall hefyd gael effeithiau andwyol sylweddol ar y dirwedd nosol ac ar ein gallu i weld y sêr, sy'n beth diflas iawn os ydych yn seryddwr! Gall goleuni gormodol hefyd fod yn anghynaliadwy ac yn ddrud i'w gynnal – pryderon amserol iawn y dyddiau hyn â ninnau mewn cyfnod o ansicrwydd economaidd a hinsoddol. Ond er pwysiced pob un o'r rhesymau uchod, mae'r erthygl hon yn canolbwyntio ar yr effeithiau niweidiol y gall goleuadau artiffisial eu cael ar y byd naturiol, a sut y mae Awdurdod Parc Cenedlaethol Eryri yn gobeithio gwella'r sefyllfa ar gyfer ein bywyd gwyllt nosol.

Am filiynau o flynyddoedd, bu cylch parhaus naturiol o ddydd a nos ar y Ddaear, gan ei fod yn troi o gwmpas yr haul. O ganlyniad, mae'r mwyafrif helaeth o rywogaethau wedi esblygu fel y gallant oroesi dan yr

amodau hyn. Dyna pam, ymysg y rhan fwyaf o organebau, ein bod yn gweld rhaniad pendant rhwng ffyrdd o fyw y rhai dyddiol (sy'n fywiog yn ystod y dydd) a'r rhai nosol (sy'n fywiog yn ystod y nos). Am ein bod ni ein hunain yn rhywogaeth o fath dyddiol yn bennaf, fe allai bobl gael eu cyhuddo o anghofio am rai o'n perthnasau nosol, neu o leiaf dalu llai o sylw iddynt. Fodd bynnag, efallai y byddwch yn synnu bod y nifer o rywogaethau sy'n cael eu hystyried yn rhai nosol yn enfawr ac, yn cyfrif am oddeutu 60% o fertebratau (anifeiliaid gyda asgwrn cefn) a 30% o infertebratau (anifeiliaid di-asgwrn cefn)[2]. Ymhlith y creaduriaid nos hyn mae ystlumod, er enghraifft, ac fe gredir fod deuddeg o rywogaethau yn byw o fewn ac o amgylch ardal Eryri ar hyn o bryd.

Astudiwyd effeithiau golau artiffisial ar fywyd gwyllt nosol dros sawl degawd. Mae rhai o'r cyfeiriadau cynharaf y gwyddwn amdanynt yn dyddio'n ôl i 1950, pan astudiodd y Brodyr Robinson effeithiau lefelau uchel o olau ar bryfed sy'n hedfan yn y nos[3]. Mae astudiaethau dilynol ers hynny wedi taflu goleuni pellach (maddeuwch y gair mwys!) ar raddfa'r dylanwad y caiff golau artiffisial ar ymddygiad rhywogaethau nosol. Mae'n waith diddorol, oherwydd yn syml iawn, nid yw delio gyda goleuadau artiffisial wedi cael ei raglennu i fod yn elfen hanfodol o fywyd rhywogaethau ar y Ddaear. Er enghraifft:

- Gall amharu ar ymddygiad cymudo rhywogaethau o ystlumod brodorol megis yr ystlum pedol lleiaf *Rhinolophus hipposideros*. Fe ddarganfuwyd, o dan oleuadau stryd, bod y nifer cyfartalog o weithiau y mae'r ystlum yn hedfan ar hyd coridorau cymudo yn gostwng yn sylweddol[4];
- Gall ymddygiad mudol gleisiaid eog yr Iwerydd (*Salmo salar*) newid dan amodau goleuo stryd, a all yn ei dro effeithio ar ffitrwydd y pysgod hynny[5];
- Mae llawer o famaliaid nosol yn osgoi ardaloedd wedi'u goleuo; mae hyn yn cyfyngu ar amrywiaeth eu harferion bwydo ac yn cyfyngu hefyd ar hyd yr amser y byddant yn ei dreulio'n chwilio am fwyd bob nos[1];
- Effaith hirdymor ar ffisioleg atgenhedlu'r Aderyn Du Ewropeaidd *Turdus merula*[6];
- Amcangyfrifir bod cymaint â thraean o bryfed hedfan sy'n cael eu denu at oleuadau stryd/artiffisial yn marw o ganlyniad i bethau fel gwrthdrawiadau gyda lampau poeth, dryswch a blinder, a all arwain at risg uwch o ysglyfaethu[7].

Fodd bynnag, mae yna lawer sy'n dal i fod yn ddirgelwch i ni. Er enghraifft, ychydig a wyddwn am effeithiau posibl goleuadau gormodol ar boblogaethau o rywogaethau, ac nid ydym yn gwybod chwaith i ba raddau y mae llygredd golau wedi cyfrannu at y gostyngiad yn y boblogaeth o wyfynod a gofnodwyd yn y DU dros yr ychydig ddegawdau diwethaf. Ar ben hynny, mae'r rhan fwyaf o ymchwil yn canolbwyntio ar nifer fechan o grwpiau o rywogaethau yn unig, felly mae gwir faint yr effeithiau andwyol sy'n gysylltiedig â goleuadau gormodol mewn cyd-destun amgylcheddol ehangach yn dal i fod yn ansicr iawn. O ganlyniad, ni allwn ond tybio y byddai ymchwil pellach yn help i gynyddu'n hymwybyddiaeth a'n dealltwriaeth yn fawr.

Er ein bod yn ddigon ffodus i fod yn gymharol rydd o oleuadau artiffisial gormodol yma yn Eryri, ni allwn fod yn hunanfodlon, ac felly rydym yn awyddus i ddiogelu'r awyr dywyll sydd gennym ar gyfer cenedlaethau'r dyfodol. Felly, mae Awdurdod Parc Cenedlaethol Eryri nawr yn dilyn yn ôl troed nifer o ardaloedd eraill yn y Deyrnas Unedig, megis Parc Cenedlaethol Bannau Brycheiniog, drwy wneud cais i fod yn Warchodfa Awyr Dywyll Ryngwladol. Os bydd yn llwyddiannus, byddai'n golygu bod oddeutu 1,342milltir^2 o Gymru yn cael ei dynodi'n swyddogol fel Gwarchodfa Awyr Dywyll Ryngwladol, sy'n cyfateb i 16.72% o arwynebedd tir y wlad. Byddai hyn yn ei gwneud y wlad â'r ganran uchaf o arwynebedd tir wedi'i ddynodi'n swyddogol yn Warchodfa Awyr Dywyll Ryngwladol mewn unrhyw le yn y byd!

Er mwyn hyrwyddo a dathlu ein hymgyrch Gweld Sêr,

cynhaliwyd cynhadledd ym Mhlas Tan y Bwlch ym mis Chwefror eleni lle rhoddodd nifer o siaradwyr gwadd gyflwyniadau ynglŷn â'r gwahanol resymau pam ein bod yn ceisio sicrhau'r dynodiad mawreddog hwn. Daeth nifer dda o bobl i'r digwyddiad – rhyw 80 o unigolion o wahanol grwpiau rhanddeiliaid, yn cynnwys peirianwyr goleuo o awdurdodau lleol, ecolegwyr, seryddwyr a'r rhai sy'n ymwneud â'r sectorau twristiaid. I mi, un o uchafbwyntiau'r gynhadledd oedd geiriau Bob Mizon o'r Campaign for Dark Skies, a ddywedodd:

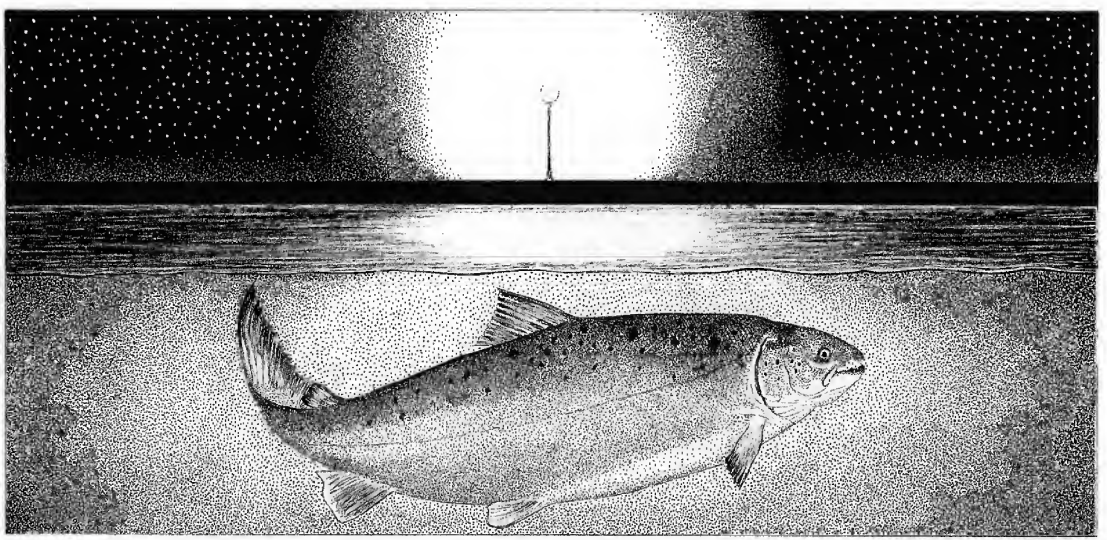
"It's now too late for most of England, which is now blighted with light pollution in the majority of areas. But you're still lucky enough here in Wales to have large areas which are still relatively free of light pollution, and thus have exceptional night time sky quality. These must be preserved for all to enjoy in future generations."

Roedd ei eiriau'n atgyfnerthu ein cred bod yr hyn rydym yn ceisio'i gyflawni yn ddilys ac yn werth chweil.

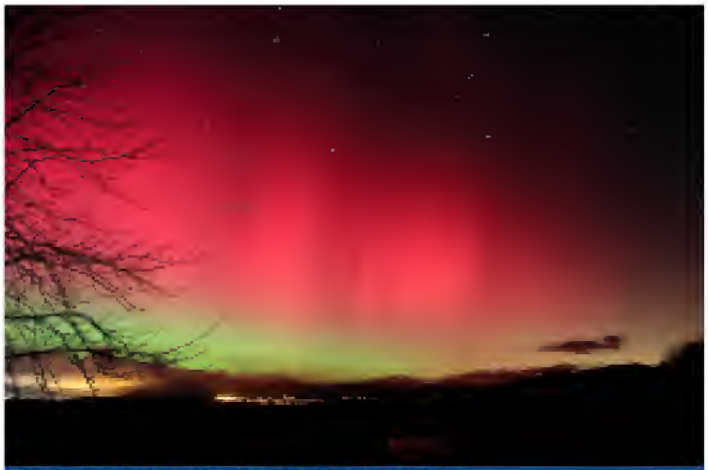
Yr unig ffordd y gallwn gyflawni ein nod o ddiogelu'r awyr dywyll sydd gennym yn Eryri yw drwy weithio ochr yn ochr â'r rhanddeiliaid perthnasol i wella'r sefyllfa lle bo angen. Nid ydym yn disgwyl i bobl ddiffodd eu goleuadau'n gyfan gwbl gan ein bod yn cydnabod bod diogelwch pobl yn hollbwysig, a bod cael cefnogaeth y cymunedau lleol yn hanfodol er mwyn cyflawni ein nod. **Yr hyn rydym yn dymuno'i hyrwyddo, fodd bynnag, yw defnyddio goleuadau priodol, o ddyluniad da, lle a phryd bynnag bo'u hangen.**

Cynhaliwyd trafodaethau eisoes â'r awdurdodau lleol perthnasol mewn perthynas â goleuadau stryd. O ganlyniad, rydym yn gobeithio, dros amser, y gellir cynnal rhaglen waith sy'n cyflwyno goleuadau o ddyluniad a sbectra mwy addas yn y Parc Cenedlaethol, yn enwedig ar hyd yr ardaloedd ecolegol sensitif e.e. dyfrffyrdd, coridorau cymudo ystlumod ac ardaloedd bwydo. Drwy weithio ochr yn ochr â thrigolion a pherchnogion busnes, rydym hefyd yn bwriadu lleihau gollyngiad golau o eiddo preswyl, llety gwyliau, canolfannau gweithgareddau awyr agored ac eiddo masnachol. Nid yn unig byddai newidiadau o'r fath yn gwella'r sefyllfa ar gyfer bywyd gwyllt y nos, ond byddai hefyd yn cyflwyno llawer o fanteision eraill megis gwneud ein cymunedau'n fwy cynaliadwy (mae goleuadau LED modern hyd at 70% yn fwy effeithlon na lampau llosgi sodiwm traddodiadol) ac yn darparu cyfleoedd newydd yn y sector twristiaeth drwy ddenu seryddwyr o ardaloedd trefol cyfagos, yn enwedig yn y gaeaf pan fo pethau'n dueddol o fod mymryn yn dawelach.

Gyda llygredd golau ar gynnydd yn fyd-eang, a dim arwydd bod y sefyllfa am newid, mae effaith ar fywyd



Nicholas Carter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Goleuni'r Goledd uwchben Trawsfynydd, gaeaf 2014 / Northern Lights above Trawsfynydd, winter 2014

gwyllt y nos yn anochel. Ar ben hynny, rydym yn byw mewn oes lle mae cymdeithas yn dod yn fwyfwy trefol, ac yn colli cysylltiad gyda'r amgylchedd. Y gobaith yw y bydd prosiect fel hwn yn tynnu sylw at broblem goleuo gormodol, tra'n gwarchod rhan o Gymru sy'n gymharol rydd o oleuadau ymwthiol, er lles pawb. Mae'n brosiect sy'n cyflwyno nifer o fanteision, yn amgylcheddol ac o safbwynt cymdeithasol-economaidd, ac mae'n cwrdd â'r dull cyfannol o gyflawni gwaith cadwraeth sydd bellach yn cael ei annog. Ac os dim byd arall, y gobaith yw y bydd yn annog mwy o bobl i fentro allan gyda'r nos i fwynhau'r awyr agored. Dydych chi byth yn gwybod, efallai y gwelwn rai ohonoch yn syllu ar y sêr yn Eryri yn y blynyddoedd i ddod!

*Mae **Gethin Davies** yn gweithio i adran Cadwraeth, Coed ac Amaeth gydag Awdurdod Parc Cenedlaethol Eryri, sef yr adran sydd yn arwain ar yr ymgyrch Gweld Sêr yn Eryri. Am ragor o wybodaeth am Fenter Awyr Dywyll Eryri, cysylltwch â Gethin ar 01766 772 255 neu g.davies@eryri-npa.gov.uk.*

Llyfryddiaeth

1. The Royal Commission on Environmental Pollution. (2009). *Artificial Light in the Environment*. The Stationary Office, Norwich.
2. Hölker, F., Wolter, C., Perkin, E.K., & Tockner, K. (2010). *Light pollution as a biodiversity threat*. Trends in Ecology and Evolution 25, 681-682. PubMed
3. Bateman, J. A. (2003). *Animal Traps & Trapping*. Coch-y-Bonddu Books, Machynlleth.
4. Stone, E. L., jones, G., & Harris, S. (2009). *Street lighting disturbs commuting bats*. Current Biology 19: 1123-1127.
5. Riley, W. D., Bendall, B., Ives, M. J., Edmonds, N. J., and Maxwell, D. (2012). *Street lighting disrupts the diel migratory pattern of wild Atlantic salmon*, Salmo salar *L., smolts leaving their natal stream*. Aquaculture, Vol 330-333; p74-81.
6. Dominoni, D.M., Quetting, M., and Partecke, J. (2013). *Long-Term Effects of Chronic Light Pollution on Seasonal Functions of European Blackbirds (Turdus merula)*. PLoS ONE 8(12): e85069
7. Bruce-White, C., and Shardlow, M. (2011). *A Review of the Impact of Artificial Light on Invertebrates*. Buglife, Peterborough.

Snowdonia 'Seeing Stars'

Life on Earth has evolved to deal with patterns of daytime and night-time, and many species rely on a period of darkness. When that darkness is disrupted by artificial light there can be serious consequences. These may be direct, such as insect collisions with hot bulbs, or behavioural: many nocturnal mammals, for example, avoid lit areas and this affects their foraging range and the availability of food. Excessive artificial light is known to affect the reproductive physiology of the European Blackbird and the migratory patterns of wild Atlantic salmon. It is known that light pollution can be detrimental to human health, but very little is known of the harmful effects associated with excessive light in the wider environment.

The Snowdonia 'Seeing Stars' campaign aims to tackle excessive light by working with residents and business owners. Changes would benefit not only nocturnal wildlife, but would improve the sustainability of communities (LED lights are up to 70% more efficient than sodium lamps) and provide new tourism opportunities by attracting astronomers, especially in the quieter winter months. A recent conference was well attended by around 80 people including local authority lighting engineers, ecologists, astronomers, and those involved in the tourism sectors.

A full translation of this article is available on our website www.naturcymru.org.uk, or by request.

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Blue Ground Beetle at Coed Maesmelin - *a mystery unravelled*

Blue Ground Beetle *Carabus intricatus* Chwilen Las y Llawr

In 2012 heavy rain brought misery to many, but it's an ill wind, as they say... The Blue Ground Beetle may have remained unnoticed in a south Wales woodland for many years, but rising stream waters brought it to the attention of a nearby discerning resident who contacted Buglife. JOHN WALTERS, CHRISTOPHER MATTS and CLARE DINHAM relate the tale.

Lying on the south facing slopes of Mynydd Drummau, Coed Maesmelin in Neath Port Talbot looks and feels like so many Welsh hillside woodlands, but look harder and it offers a glimpse into the past. Owned and managed by the Woodland Trust (Coed Cadw), it is offering up exciting secrets to us with new discoveries for the region and a first for Wales – the Blue Ground Beetle *Carabus intricatus*.

This spectacular insect is found in ancient pasture woodlands, and at 38mm long it is Britain's largest ground beetle and also one of the rarest. Mainly black with blue-violet reflections on its body, its wing cases are intricately sculptured and its long legs give it a spidery appearance. It is nocturnal, emerging from its daytime retreat at dusk to climb trees in search of food and mates. Being a specialist slug hunter, with a preference for the Tree slug *Lehmannia marginata* and Ash-black slug *Limax cinereoniger*, the beetle hunts by following slime trails. When it finds a slug it uses large pincer jaws to grip its slippery prey. A digestive juice is injected into the slug which quickly kills it and dissolves

the body. The beetle will then suck up this 'slug soup' until there is nothing left of the slug. It is a very efficient predator and can eat a slug as large as itself in half an hour. The beetle's abdomen can swell to twice its normal size to accommodate this large meal!

The Blue Ground Beetle was thought to be confined to a handful of woodlands in Devon and Cornwall around Dartmoor and Bodmin Moor until it was unexpectedly found in Skewen, near Neath. In 2012 local resident Lee Beynon discovered one in his garage and contacted Andrew Whitehouse at Buglife, and the identification was confirmed. Mr Beynon then found two more beetles in his garden. Gardens are not a typical habitat for this beetle, so it was assumed that they had somehow strayed from the nearby Coed Maesmelin.

In May that year Andrew Whitehouse, with entomologists Duncan Allen and John Walters, visited the site to investigate. Although May coincides with the beetle's main period of activity, and despite searching the woodland extensively by torchlight, no Blue Ground Beetles were found that night; however, daytime surveys did indicate that the habitat was suitable. So where had the beetles come from? It was likely that they were in the woodlands somewhere and the investigators had been unlucky in their search. The beetles in the garage and garden had appeared after periods of heavy rain, and it was thought that a stream running from Coed Maesmelin through the adjacent residential area had carried them out of the wood, along with other debris, and left them caught up in a pile of twigs near Mr Beynon's garage.

Several more beetles were found in Mr Beynon's garden and garage over the next year but the beetle had yet to be found in the woodland. In 2014 Dave Boyce and John Walters were asked by Natural Resources Wales to conduct another search for it. The woodlands were searched extensively in May with the help of local coleopterist Steve Bolchover, but again none were found. It is possible to miss the beetles when night searching once but twice seemed very unlikely.

An alternative method is to search for the beetles

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Tree slug *Lehmannia marginata* Malwen ddu y coed – favourite prey of the Blue Ground Beetle

when they are hibernating under moss-covered bark during the winter. In January 2015 a second visit was made in the daytime and this time it was successful. Two female Blue Ground Beetles were found in Coed Maesmelin and the mystery was solved!

This confirmation of the beetle's presence has led to the question of why it has been able to survive here, hundreds of miles away from its only other known populations in Devon and Cornwall. The answer lies in the site's varied history and management which has provided a continuity of the right habitat.

Coed Maesmelin – the past informing the present

Surrounded on three sides by conifer plantations, housing developments and quarries, Coed Maesmelin is a remnant of a much larger ancient woodland. Fortunately it has never been converted into a coniferous Planted Ancient Woodland Site (PAWS) or built on for housing. The site was acquired by the Woodland Trust after a successful fundraising appeal in 1998, and became the 1000th woodland to be protected by the Trust in the UK.

The woodland's main historical journey begins around 1130 AD under the ownership of the Cistercian Monks at nearby Neath Abbey. The woodland then probably had a similar character as

today, with a predominant sessile oak canopy (*Quercus petrea*) and an understorey of birch, hazel, ash, and holly. It was fortunate not to have been cut down by the monks as part of 'assarting', whereby areas of woodland were permanently cut down, ploughed and converted into farming practices. Records show that Coed Maesmelin was used as part of a grazing system, where cattle and sheep were reared on and around the slopes of Mynydd Drummau along with herds of wild deer, helping to shape the woodland structure seen today.

Evidence of traditional woodland practices (e.g. timber products such as charcoal for iron production, bark for tanning leather, and wood as fuel) can still be seen today in the abundance of old coppice stools and a scattering of charcoal hearths across the site, as well as old wood banks and field boundaries.

Over the centuries ownership has changed hands, and the wood eventually passed to local iron foundry owners. When the demand for charcoal declined, timber was probably sold as firewood and used as pit props for the local coal mines nearby: however, some charcoal production remained, serving the local chemical works in the Vale of Neath up until the 19th century.

©WTPL Woodland Trust

The south-facing slopes of Coed Maesmelin are good habitat for the Blue Ground Beetle

Evidence that Coed Maesmelin has a long history can also be seen in the rich and varied ground flora during spring and summer months, indicating a continuous wooded habitat on site.

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Overwintering adults will excavate shallow depressions beneath moss on tree trunks

Plans for the future?

Coed Maesmelin stands today as a timely reminder of how precious our ancient woodlands are, but also how important it is to manage the site. Blue Ground Beetles favour woodlands with a sparse understorey of vegetation below the trees, and are usually found in ancient oak and beech woods with a southerly aspect. Coed Maesmelin hasn't been grazed since the late 1990s, and since that time bramble has started to encroach the woodland floor making it less suitable for the beetle. Plans are now being considered to undertake restoration, which may include

the reintroduction of grazing in the woodland where practical.

It is possible that the Blue Ground Beetle may be found at other sites in south Wales, particularly where ancient oak and beech woods grow on south-facing slopes. Buglife and Coed Cadw will be holding a series of training events based around surveying for the Blue Ground Beetle, and undertaking ancient woodland restoration and management. This will form part of an extension to the current targeted Heritage Lottery Fund restoration project the Woodland Trust is delivering across Powys, Ceredigion and North Wales, whereby the Trust is supporting private landowners to restore their ancient woodlands gradually.

Wider partnership working is essential to deliver greater protection for ancient woodland and develop a better understanding of the management needed for the Blue Ground Beetle. Like many other ancient woodland projects, there is 'an urgency to start but no rush to finish'.

There are a number of closely related large ground beetles which the Blue Ground Beetle can be mistaken for. A free guide to identifying these beetles (*No. 1. Carabus, Calosoma* and *Cychrus*) can be downloaded at **http://johnwalters.co.uk/publications/guide-to-british-beetles.php**

To find out more about ancient woodlands and restoration visit: **www.woodlandtrust.org.uk**

Acknowledgments
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***John Walters** is a field naturalist and wildlife artist based in Buckfastleigh, Devon. He has a particular interest in ground beetles and has been studying the ecology of the Blue Ground Beetle since 1996. www.johnwalters.co.uk; **Christopher Matts** is Woodland Manager for the Woodland Trust/Coed Cadw, and manages the Trust's estate across south and west Wales; **Clare Dinham** is Conservation Officer with Buglife.*

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Close up of a female Blue Gound Beetle found in Devon, 2013

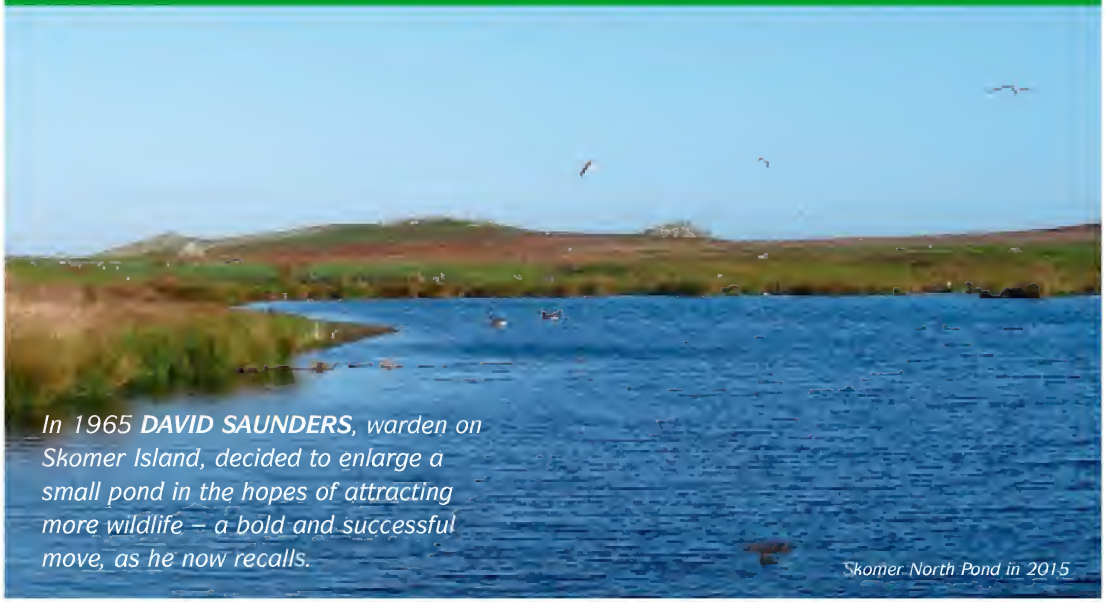
Cyntaf i Gymru

Credwyd fod poblogaeth y DU o Chwilen Las y Llawr *Carabus intricatus* wedi'i chyfyngu i Ddyfnaint a Chernyw, ond yn 2015 cadarnhawyd ei bod yn byw yn ne Cymru. Mae'r chwilen hon yn arbenigo mewn hela gwlithod liw nos: mae'n dilyn trywydd llysnafedd ac yn llowcio gwilthod drwy eu chwistrellu â sudd treulio sy'n troi eu tu mewn yn 'gawl gwlithen' ac yna'n ei sugno allan. Mae Coed Maesmelin ger Castell Nedd yn gynefin perffaith i'r chwilen fawr brin hon, ond dim ond pan ddarganfu preswylydd lleol yr un gyntaf yn ei garej yn 2012 y sylweddolwyd y gallai'r chwilen fod yn bresennol. Tybiwyd fod glaw trwm a nant fechan wedi golchi'r chwilod i'r gerddi cyfagos. Bu entomolegwyr yn chwilio'r coedydd gerllaw ar lethrau deheuol Mynydd Drumau ond nid tan 2015 y llwyddon nhw i ddod o hyd i'r chwilen. Mae cynlluniau ar y gweill bellach i reoli'r safle gyda phori gofalus i wastrodi'r mieri ymwthiol.

FIFTY YEARS AGO

The North Pond on Skomer

Jason Moss



In 1965 ***DAVID SAUNDERS****, warden on Skomer Island, decided to enlarge a small pond in the hopes of attracting more wildlife – a bold and successful move, as he now recalls.*

Skomer North Pond in 2015

One of my early tasks as newly appointed Skomer warden in 1960 was the construction of a hide overlooking the North Pond, largest of the island's two ponds. Built of driftwood, it held just two persons. The pond always had a special attraction for me; hardly a day went by without a visit, while my first article was 'Island Pond' in *The Countryman* Summer 1963, with illustrations by Robert Gillmor.

The pond – dependent entirely on rainwater, there being no spring or stream – was barely half an acre in extent and about three feet deep when full. Whatever the season, there was always much of interest there. A noisy flock of lesser black-backed and herring gulls dominated the open water. If you were lucky, a brief sight of a shy moorhen, or a mallard leading her ducklings.

As the summer advanced and the water level dropped, passage waders arrived, none normally staying long. On one special day during my first August, a green sandpiper and a wood sandpiper appeared together, providing a marvellous opportunity for comparison. During the stormy autumn of 1961 a grey phalarope spent the day merrily spinning on the surface.

Despite many such delights I always yearned for a larger pond and in the late summer of 1965 the opportunity beckoned. Water levels had dropped, only a small pool remained, and even the gulls barely used it. So for the first time I connected up the front end loader to the island tractor, and on 23 August set forth. I had not included the work in proposals for the year and neither was there any prior consultation. I grabbed the opportunity and away I went. Those were the days!

That year also saw a new initiative. I had voluntary wardens to assist for the very first time, twelve in all, scattered through the season. The first, who came in April and again from mid-July until mid-September, was an enthusiastic schoolboy, Michael Alexander.

David Saunders

In 1961 Skomer North Pond covered barely half an acre

He was much involved in the pond work so it was no surprise when very much later, on his return to Skomer as warden, that he created a pond.

The other late season volunteers, a visitor and my wife all played major roles in the work, finally completed on 4 October. Their efforts succeeded in raising and lengthening what had been a low wall. The work had its share of hiccoughs, such as getting completely bogged down, while on one occasion an oil pipe burst. In the last remains of water we added three eels to the island list. Now it was up to the winter rains in our absence to do the necessary.

On return in March 1966 I was dismayed to find that a breach had occurred in the dam through which the water poured. Repairs were quickly put in hand and slowly the level rose. In the late summer, on a driftwood sledge pulled by the tractor, my wife and I took our boat to the pond. With this we transported countless loads of stone to provide protection for the dam while a new hide of driftwood could now be approached unseen by birds on the pond.

The enlarged North Pond quickly lived up to my high hopes with a redshank on 9 March – indeed there were eleven sightings that year, compared to just six in the previous six years. Pectoral sandpiper, little grebe and coot were first records for Skomer and coot subsequently nested.

Black-headed gulls quickly established a colony in a stand of *Calluna* heather now partly submerged. The numbers rose to a peak of 22 pairs in 1969, but three years later, as by now the heather had deteriorated, none nested.

The trend has continued across the years since. Breeding birds have included shelduck, teal, pintail and shoveler. Scarce visitors have included Bewick's swan, pochard, scaup, goldeneye, little ringed plover, knot, curlew sandpiper and lesser yellowlegs.

The disturbed soil on the dam that first year resulted in three plant records of note, wild radish, celery-leaved buttercup and an early Pembrokeshire record of rape.

David Saunders

David Saunders

In 1966 heather is submerged by rising water levels

David Saunders

Excavation 1965

1966

1966

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Malltraeth Marsh:

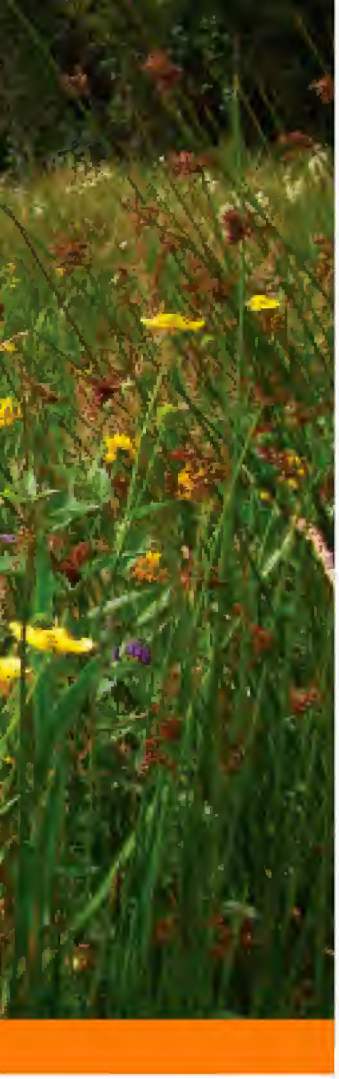
Digging for Victory

The spring glory of Malltraeth's mixed species swamp.

For two decades the RSPB has been using innovative methods to turn an area of rushy fields into diverse wetland habitats for birds and a range of other wildlife. ***IAN HAWKINS*** *describes the use of specialised machinery to open and maintain dynamic habitats as well as the outcomes for some scarce plants and animals.*

In 1994 an area of rather unexceptional low-lying rushy fields in south-west Anglesey attracted the attention of the RSPB because it already had some small lakes and there was potential for more extensive wetland habitat creation. As a result over 280 hectares on the south-east side of the Cefni Valley are now managed as a nature reserve. Works over a period of 20 years to improve habitats for a variety wildlife, as well as birds, are described here.

Much of the work to create new water bodies and areas of reed and swamp has been done as grant-funded projects, initially through the EU LIFE fund, then an HLF-supported Wetlands for Wales project, and most recently the 'Magical Malltraeth' project supported by the WREN Biodiversity Action Fund. This last project started in 2011 and has helped create over 3km of new ditches and eight pools totalling 3400m^2, and scraped 9.4ha of ground for reed and swamp to colonise. It also enabled a Softrak tracked tractor to be purchased to help

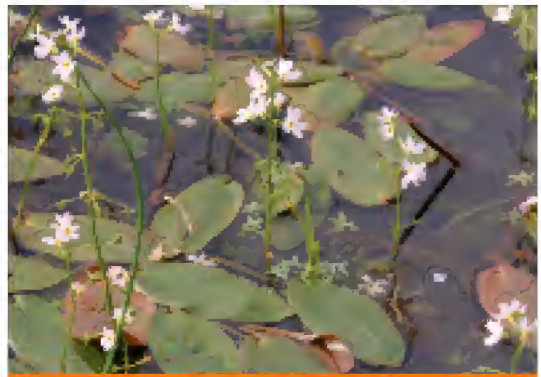


manage the reed beds and the softest parts of the grazing marsh.

Setting and background

The tidal estuary of the Afon Cefni once extended far into the south-western side of Anglesey. It lies in a valley with a NE-SW orientation, following the Berw Fault. This is part of an ancient fault system that has been guiding the landforms of the island for millions of years – most notably giving us the Menai Strait, and Anglesey its island status. The Irish Sea Ice Sheet preferentially scoured softer Carboniferous rocks on the west of the Berw Fault to form the Cefni valley. When the ice retreated, the sea rolled in, creating estuarine conditions as far inland as Llangefni, some 13km from the open sea. As with many Welsh estuaries, the accretion of marine sands filled the inlet over time and this was capped with clay-rich marine alluvial soils and salt marshes in the inner parts.

Between 1781 and 1811 several of the big Anglesey landowners collaborated to claim 21 square kilometres from the sea as farmland, by building the Cob Bank across the estuary. At the same time they canalised and embanked the Afon Cefni, with a system of ditches and sluices to either side. The whole valley was then divided into fields using clawdds – an ingenious boundary system of two ditches with the earth piled into a bank between them, topped with hedging. This simultaneously provided drainage, stock-proof barriers and shelter from sharp winter winds.



RV Lansdown

Water violet (*Hottonia palustris* Pluddail y dŵr) an early colonising aquatic plant that is a designated feature of the SSSI

Draining the valley also allowed Victorian landowners to mine a seam of coal which runs diagonally beneath it. The ruins of the Berw Colliery, in the north of the reserve, are the most obvious remains of this short-lived industry, and are now a Scheduled Ancient Monument. It was subsidence from this mining that created the small lakes and fens within the farmland that initially attracted the RSPB to the valley. From rather uniform rushy fields a broader spectrum of wetland habitats is developing, with more open water, reed beds and mixed species swamps, fen-meadows, tightly grazed grassland for lapwing, scrub and hedgerows.

Open water

The open water includes isolated ponds, shallow temporary water features, field ditches, reed bed ditches and pools, and the two lakes of the Llynnau Gwaith-glo (coal mining subsidence lakes). These lakes and the perimeter ditch system were inherited, but the rest were created over the last 20 years by digging, scraping, and raising water levels. The water bodies here support 27 important aquatic and emergent plant species. Some are showy plants that would grace the margins of any waterbody, such as flowering rush *Butomus umbellatus*, and water violet *Hottonia palustris*, whilst others are more obscure, such as six of the eight UK species of water-starwort *Callitriche spp.* (Malltraeth is now the most important site in the UK for this genus). Some of the species are designated features of the Malltraeth Marsh Special Site of Scientific Interest (SSSI), which covers most of the valley between the Cob bank and the A5 road. Yet more uncommon aquatic plants

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2012 aerial looking NE: showing the development of reedbeds with pools and waterways; and tightly grazed pasture with shallow wet features following the courses of historic saltmarsh creeks.

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1994 aerial looking NE: showing Llynnau Gwaith-Glo and fields of rather uniform rush pasture

have been noted in recent surveys by the Anglesey Flora Group and Richard Lansdown. There is a good eel population and care is taken to ensure that sluices and pipes do not inhibit their movements in and around the site. Otherwise fish are limited; rudd and sticklebacks occur, with trout in the surrounding watercourses. Family groups of otters are seen every year.

Swamps

There are now 52 hectares of reed beds and mixed species swamp. Most of the reed beds have been created in the southern half of the reserve, around the lakes and lower-lying fields nearby. Ditches and pools were dug within these fields, and the spoil was placed around the perimeter to bund them so that water levels could be raised without affecting neighbouring land. Reed plugs were planted and, as the reed beds developed, turfs of existing reed were transplanted to seed new areas as they in turn were dug. In the northern half, higher water levels produced a botanically richer swamp, and so water bodies were dug into this, rather than replacing it with reed.

The initial impetus for buying the reserve was to attract bittern back to Wales as a breeding bird. Bitterns now overwinter at RSPB Malltraeth every year with at least 3-4 birds present in recent winters, but we have yet to persuade them to stay and nest.

Other birds have proved easier to please. Breeding duck numbers have increased from six pairs in the mid-90s, to 136, with significant numbers of shovelers, gadwalls, pochards, and the occasional garganey. There are 60-70 pairs of rails including up to 17 water rails. Spotted crakes are recorded occasionally; and in 2012, 4-6 male Baillon's crakes held territory – a unique occurrence in the UK.

Breeding wetland passerines including grasshopper, sedge, reed, and Cettis' warblers occur, and reed buntings have increased from 11 singing birds in 1995 to 338 when they were last fully surveyed in 2012. The reserve is a National Key Site for water voles and these habitats play an important part in maintaining a thriving population. The mixed swamp

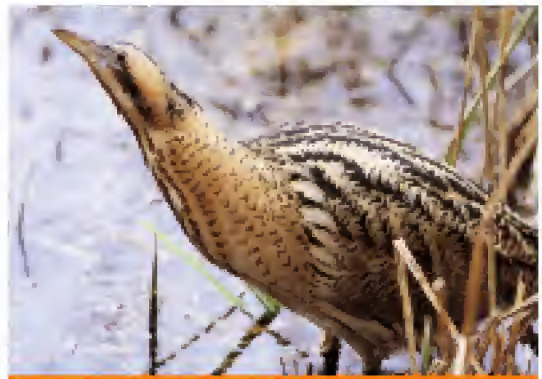
is a beautiful sight in spring with glorious stands of wetland plants such as yellow flag, greater spearwort, bogbean and the delicate water violet.

Outside of the breeding season the reed beds are used by roosting birds. Numbers of swallows reach 5,000 in most summers (50,000 in 2004), pied wagtails can reach 100 birds, and for a few weeks in late autumn as many as 250,000 starlings arrive each night from all corners of the island to all but flatten the reed bed.

Grazing marsh

Drier fields are managed for breeding waders – most notably lapwing. To this end the sward is closely grazed. The rush is cut two or three times a year and periodically weed-wiped to reduce its dominance in the sward. Temporary wet features have been scraped for lapwing chicks to feed in; many of these follow the course of the historic creek system which can still be seen from aerial photos.

Breeding numbers of lapwings in Wales and much of the UK have plummeted since the reserve was first purchased. Lapwings have become a high priority at RSPB Malltraeth Marsh as numbers in the wider countryside continue to fall, and they have become increasingly reliant on specific management on nature reserves. Numbers of lapwing on the reserve have fluctuated, from past highs of 12-13 pairs, to lows of 1-2 pairs. Studies using nest cameras and data loggers have shown that our increasingly isolated population is very vulnerable to nest-raiding foxes. This information prompted two electric fences to be put up in 2011, enclosing 33 hectares. The money for this came from Tesco customers through the Welsh Government's carrier bag levy. The purchase of the Softrak in 2012 also allowed the rush to be cut even in wet summers when the ground remains too soft for tractors, or when fields are flooded. The combination of greater protection from foxes and better sward management has helped the population to double the previous highs. In 2014, 24 pairs of lapwing bred, fledging 49 chicks. The grazing marsh also supports around 20 pairs of skylarks and one or two pairs of curlews. Brown hares are found in the southern half of the reserve.



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Great bittern (*Botaurus stellaris* Aderyn y bwn) now wintering in increasing numbers.

RV Lansdown

Pillwort (*Pilularia globulifera* Pelenllys gronynnog) is a fern that likes to colonise bare mud and shallow water

Much of the value of the grassland lies not in the sward itself, but in the wet areas associated with it. The temporary scrapes have become an important niche for a suite of scarce mud-loving plants, most notably two Biodiversity Action Plan (BAP) priority species, lesser water-plantain *Baldellia ranunculoides* and pillwort *Pilularia globulifera* – an inconspicuous grass-like fern named after its pill-sized spore cases. Pillwort in particular has responded magnificently to the amount of bare mud now available. It is estimated that it now covers a hectare of land, making it one of the most important metapopulations in the UK, and vividly demonstrating the value of creating new opportunities within habitats.

Fen-meadows

These are transitional areas – too dry to be swamp, too wet to be farmed as grazing marsh. They are dominated by tall rushes and sedges. They are not heavily managed; some areas are lightly grazed, and the rush is mown occasionally in other areas to give other plants a chance to compete. The difficulty of

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Areas of reed can be increased by scraping back their margins and transplanting reed turfs. This also provides temporary niches for key aquatic plants.

dealing with the cut material currently limits more intensive management. Wildfowl and many of the reed bed passerines spill over into these fens. There are also good populations of tubular water-dropwort *Oenanthe fistulosa*, and marsh stitchwort *Stellaria palustris* – both nationally vulnerable species. Willows and alder are creeping into some areas, creating further variety and opportunities for wildlife. Twenty ponds have been dug in the fen-meadow areas as part of the Million Ponds project. The ponds are shallow-edged and isolated from the ditch system, providing areas for amphibians to spawn away from predatory fish. It is also hoped that several of the scarce plants will colonise them.

Scrub and hedges

There are small blocks of willow carr in some of the original fen areas near the old mines, and willow is pushing into the earliest of the wetland areas created by the RSPB. Some carr is maturing and decaying, providing valuable dead wood. On higher ground around the old coal workings, willow is joined by alder, thorns and ash to form areas of denser scrub. Many of the hedgerows contain mature trees, and Lon Tan Ferw – a farm track leading down from Plas Berw – forms a tree-lined avenue including many mature oaks.

Hedges have been planted or restored, and protected from browsing livestock on the higher ground. On the floodplain a balance has to be struck between removing some of the hedgerows to create a more open grassland to suit lapwings and maintaining the historic landscape. The hedges support many woodland-edge birds, notably up to 32 willow warbler territories. They are also home to larger nesting birds, with buzzards, ravens, and sparrowhawks in the larger trees, and kestrels and barn owls using nest boxes. Our newest mammal is a red squirrel spotted in 2014, in the trees under the Berw ridge.

Visiting

There are several public footpaths running through the reserve, which provide plenty of opportunities to enjoy its riches. It is next to the Lon Las Cefni cycle-path, which runs down the middle of the valley, and there is a car park just off the A5 below Pentre Berw, which is maintained by Anglesey Council. For more information please visit www.rspb.org.uk/malltraeth or call the RSPB Cymru Bangor office on 01248 672 850.

***Ian Hawkins** is manager of the RSPB Malltraeth Nature Reserve.*

Cors Malltraeth

Mae Cors Malltraeth yn gorwedd yn ne-orllewin Ynys Môn ac mae'r RSPB wedi gweithio i wella cynefinoedd bywyd gwyllt yma ers dros 20 mlynedd. Ar un adeg roedd aber Ilanwol Afon Cefni yn ymestyn 13km i mewn i'r tir, ond draeniwyd 21 km sgwâr gan ffermwyr yn y G18fed a'r G19eg. Bellach mae'r ardal yn un o gynefin gwlyptir hynod o amrywiol, gyda gwelyau cyrs, siglenni, dŵr agored, cors bori, dolydd corsiog, prysgwydd a chloddiau, sy'n galluogi nifer cynyddol o rywogaethau bywyd gwyllt i'w phoblogi. Mae angen dulliau rheoli gwahanol ar bob ardal, gyda thori cyrs, pori, creu gwalau dros dro, adfer a gwarchod grwychoedd, a chloddio pyllau i gyd yn helpu i ffurfio'r cynefinoedd. Ymhlith y rhywogaethau prinnach a welir yma mae aderyn y bwn yn gaeafu, llygoden y dŵr, pelenllys, a'r dylluan wen. Mae chwech o wyth rhywogaeth y DU o frigwlydd y dŵr *Callitriche spp.* yma. Mae cornchwiglod yn arbennig o fregus, ac mae dwy ffens drydan yn atal rheibio gan lwynogod.

All photos: © NMW

Dinosaur discovery - new kid on the Jurassic block

The preserved hand and finger bones of a new dinosaur

Wales is not traditionally known for its dinosaur fossils, but a recent discovery in 2014 may be about to change this. When ***CINDY HOWELLS*** *was asked to identify some remains from a south Wales beach she found herself looking at a previously unknown species that will put Wales on the therapod map...*

Museum geological curators are often the first port of call when a member of the public finds something interesting on a beach. Usually it's a strange shaped pebble, or piece of industrial slag, or the impression of a fossil long since disappeared. It's pretty rare that one might get an enquiry leading to a new, and very important, scientific discovery which should catch both public and media attention – the first almost complete fossil skeleton of a meat-eating dinosaur ever to be found in Wales.

How it began

In March 2014 I was contacted by two collectors who had found some fossilised bones on a beach near Penarth, South Glamorgan. They wanted confirmation of their identification, as they suspected it might be something special.

The beaches around Wales are particularly rich in fossil finds. Wales has a wonderfully varied geological history, with sedimentary rocks ranging

The tip of the dinosaur's jaw

in age from over 550 million years old, right through to peat deposits only a few thousand years old. The coastline in south-east Wales is composed of Jurassic and Triassic rocks overlying the older Carboniferous limestone. The dinosaur fossil was found at a transitional point between the Triassic and Jurassic. Brothers Nick and Rob Hanigan often go fossil hunting along this section, and spotted that there had been a cliff fall which might be worth checking. The cliffs here are very unstable and it is dangerous to go near the base of them, so Nick and Rob carefully checked the blocks which had fallen some distance away. Suddenly they spotted what looked like fossil bone on the edge of a rock.

Vertebrate material is not unusual here but mostly it belongs to marine reptiles such as ichthyosaurs and plesiosaurs. The brothers collected as many blocks as they could find, and took them to a professional preparator to try to remove a little of the overlying rock. They very quickly realised that the bones weren't those of an ichthyosaur, but looked more like the limb bones of a land animal. Opinions from an internet fossil forum suggested crocodile, or possibly dinosaur. As Collections Manager for the palaeontology collections at Amgueddfa Cymru, I was one of those contacted for an opinion, and was pleased to confirm that it was in fact a dinosaur.

Identification

The dinosaur is currently being studied by expert vertebrate palaeontologists prior to being published, and so it hasn't yet even been named. We know that it was one of the very earliest Jurassic dinosaurs as it was found in rock layers just one meter above the Triassic/Jurassic boundary. There is evidence of late Triassic dinosaurs locally, with many footprints and a few isolated bones. However, these are several million years older, from a time when Wales was a hot, dry, lowland desert. This was a time of great change globally as the super-continent Pangaea was starting to break up and sea-levels were rising.

By the start of the Jurassic Period south Wales had become a coastal area, bounded by warm shallow seas to the south and higher ground to the north. In this more favourable climate, and following on from a major extinction event, terrestrial animals such as dinosaurs and early mammals prospered and diversified.

The first dinosaurs (about 245 million years ago) were mostly small to medium-sized, slender, upright bipedal forms rather than of a traditional lizard-like sprawling posture. They rapidly evolved into two distinct groups – the 'bird-hipped' ornithischian and 'lizard-hipped' saurischian types. The ornithischians include herbivorous forms such as *Iguanodon*, *Stegosaurus*, and *Triceratops*, while the saurischians include two major groups: the large herbivorous sauropods such as *Diplodocus*, and theropods which are mostly carnivorous. Our new

dinosaur belongs to the very earliest group of theropods, the coelophysids, and is related to the late Triassic dinosaur *Coelophysis* from North America.

The new specimen was a small animal, standing no more than 50cm tall. It had a long, fairly rigid tail for balance, and was probably covered in a slight fuzz of feathery tendrils. It is known from later dinosaur discoveries that many theropods had these protofeathers, probably for warmth, or even display purposes. It is these early filamentous structures which later developed into true feathers. One group of feathered theropod dinosaurs evolved into birds about 150 million years ago, and these were the only dinosaurs which survived the major extinction event at the end of the Cretaceous Period, 66 million years ago.

The tiny teeth show numerous serrations

The fossilised bones of the new specimen are preserved on the surface of five main blocks, and although some are adjacent to each other, in life position, many are somewhat scattered. It is likely that the animal was scavenged by fish, and invertebrates such as echinoids, before it was covered by sediment; there are many fragments of echinoid plates and spines preserved between the bones. We can't tell why the animal died, although we do know it was a juvenile as some of the bones are not fully formed. It was living close to the sea, possibly hunting for insects and small animals along the beach, and could have had an accident, or succumbed to illness, before its carcase was washed out to sea.

Artist's impression of the new therapod

In context

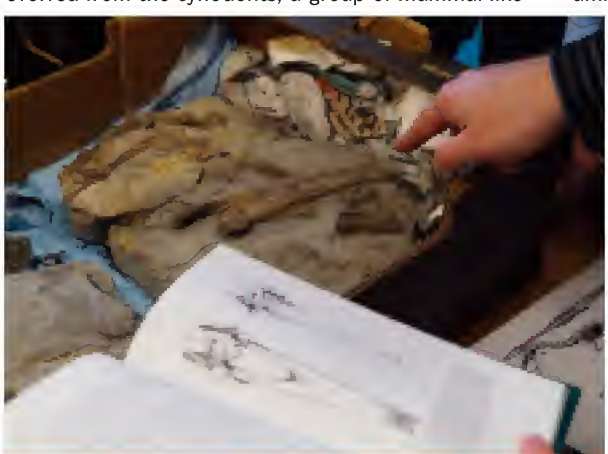
The warm, shallow, but fluctuating seas of the early Jurassic in south Wales were a continuation of those spreading across Somerset and down to the richly fossiliferous areas of Dorset. For a while several higher areas, formed of older Carboniferous rocks, stood out as islands in this shallow sea. On these islands lived a diverse population of small mammals, lizards,

sphenodonts and other reptiles, including early dinosaurs, and the remains of these are preserved in ancient fissures in the limestone. Two hundred million years ago, as now, the limestones were slowly dissolving in rainwater, producing caves and fissures. Some animals might have lived and died in these caves, while others were washed in by rain and floods. These fissure-fills give us a unique picture into the life of this time. The only other partial dinosaur skeleton from Wales comes from these fissures near Cowbridge. It is a herbivore prosauropod dinosaur called *Pantydraco caduci* (meaning The Fallen Dragon from Pant Quarry). This specimen was found in 1952, but only described as a new species in 2003.

The presence of other dinosaurs can be established from the remains of single bones, such as a jaw bone and a finger, found near Bridgend and Penarth respectively, of a larger meat-eating dinosaur. Other than that, we have only the fossilised footprints of dinosaurs in Wales. The now famous site at Bendricks Rock, near Barry, is one of the most important late Triassic dinosaur footprint sites in Europe. It preserves many trackways of both large and small theropods as well as quadrupedal, herbivorous dinosaurs and other reptiles.

Alongside these dinosaurs lived a wide variety of other animals, but important amongst them were the early mammals. At this time mammals had just evolved from the cynodonts, a group of mammal-like reptiles (synapsids). Cynodonts were warm blooded with more advanced teeth, jaw hinges and muscle systems, allowing more effective food processing. The evolution from these into true mammals was a very gradual process, but it is generally accepted that *Morganucodon* from south Wales was one of the first. These early mammals were probably preyed upon by the new dinosaur and its close relatives.

Marine reptiles such as ichthyosaurs and plesiosaurs lived in the shallow seas and were active predators of fish and invertebrates – and each other! Complete skeletons are incredibly rare locally, but teeth and pieces of vertebrae are not uncommon. Invertebrates included bivalves, gastropods, echinoids, corals, crustaceans and of course ammonites – very popular with fossil collectors. The first true ammonites evolved at the start of the Jurassic Period, 201 million years ago. In the UK, the earliest species is *Psiloceras planorbis*, a flattened, un-ornamented ammonite. However, in other parts of the world there are other species of *Psiloceras* which occur just below *P. planorbis*. The International Commission on Stratigraphy has decided that the international base of the Jurassic should be placed at a section in Austria where the earliest of these *Psiloceras* are found. This exact point in the rock layers can be correlated by a global peak in oxygen isotope levels. This allows us to work out the precise base of the Jurassic, even in areas like south Wales, where the first appearance of ammonites is not diagnostic.



The bones are checked against those of other species

What happened next?

Nick and Rob had stated their intent, at an early stage, to donate the specimen to Amgueddfa Cymru in Cardiff as they considered that such an important specimen should be housed in a museum for the public to appreciate, and to protect it for future generations. Obviously we were delighted by such a generous offer, and have spent the last year working through the details of this important acquisition. Further careful preparation work revealed more of the bones, and photographs were exchanged regularly, all whilst keeping it a secret. We had all decided that the museum could gain maximum publicity from this find if it was kept

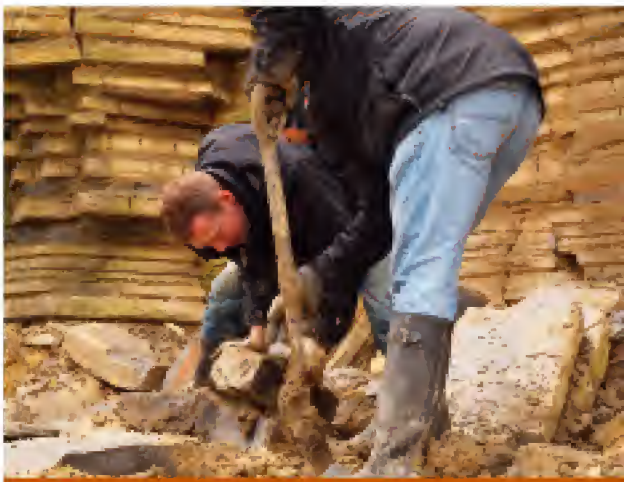
under an embargo until it was displayed to the public.

As such an important find, the dinosaur needed to be properly researched by specialists in case it turned out to be a new species. There are very few early theropod specimens anywhere in the world, and it was likely this one could add a great deal to our understanding of such animals and their evolution. Dr Dave Martill of Portsmouth University is a world expert on vertebrate fossils, both dinosaurs and pterosaurs, so we asked him to take a look at our specimen. With the aid of his postgraduate student, Steve Vidovic, Dave Martill embarked on a project to measure and quantify all of the dinosaur's bones, and then input this data into software which would relate it to other similar dinosaurs. This process is called cladistics, and aims to establish the relationships between species, putting them all into an evolutionary tree. We have photographed each piece of bone at a high resolution, and this has enabled further study of the specimen without having to transport it to Portsmouth. With input from myself, and Dr John Nudds from Manchester University, the team are about to submit a scientific paper publishing the results of these studies and also giving the specimen its own scientific name as the holotype of a new species.

Future plans involve X-raying the blocks to try and identify parts of the bones which are still underneath the rock. The fossil is mostly preserved in soft mud which makes the bone very fragile and means that preparation is incredibly difficult. It is almost certain that there are still secrets buried under the visible surface. We intend to keep the specimen on display permanently, and also to allow further research as appropriate. If future funding becomes available we would like to display it alongside a dynamic life-sized reconstruction to enable visitors to have a better understanding of the dinosaur. Amgueddfa Cymru is very grateful to Nick and Rob Hanigan and their families for allowing this specimen to come to the museum.

The theropod fossil is on display in the main hall of the museum from 9th June until 6th September 2015. After this it will be displayed in the Insight Gallery before going on permanent display in the Evolution of Wales gallery.

***Cindy Howells** is a curator and also Collections Manager of the Palaeontology section at Amgueddfa Cymru–National Museum Wales. She is interested in all aspects of palaeontology and is especially interested in interpreting Welsh geology and fossils.*



Nick and Rob Hanigan looking for fossils

Darganfod dinosor

Mae gan Gymru sawl cofnod o ffosiliau'n ymwneud ag amryw byd o rywogaethau, ond ychydig iawn o esgyrn dinosoriaid. Taniwyd chwilfrydedd dau heliwr ffosiliau ar draeth ym Mhenarth pan ddaethant o hyd i rywbeth nad oeddynt yn ei adnabod, ac fe gysyllton nhw ag Amgueddfa Cymru. Cafodd y gweddillion, sydd bron yn gyflawn, eu darganfod uwchben y ffin Triasig-Jwrasig, sef cyfnod pan oedd de Cymru a Gwlad yr Haf wedi'u gorchuddio gan foroedd cynnes, bas. Darganfuwyd bod yr olion yn rhywogaeth hollol newydd o therapod – dinosor cigysol, deudroediog ifanc oddeutu 50cm o daldra. Yn ôl pob tebyg roedd wedi'i orchuddio gan dendriliau pluog, oherwydd gwyddys fod gan fathau eraill o therapodau blu o ryw fath, ac esblygodd un grŵp yn adar oddeutu 150 miliwn o flynyddoedd yn ôl. Dyma rywbeth hollol newydd i Gymru ac, yn wir, i'r byd, a bydd yn ychwanegu at ein dealltwriaeth o'r rhywogaeth hon a'i hesblygiad. Bydd y dinosor yn cael ei arddangos yn barhaol yn yr Amgueddfa o fis Mehefin 2015 ymlaen.

R Unsworth

Seagrass meadows in Wales:

vulnerable features and fish nurseries

Productive and abundant seagrass (*Zostera marina* Gwellt y gamlas) at Porthdinllaen.

In a few places in Welsh seas, seagrasses form extensive, biodiverse and productive meadows. ***RICHARD UNSWORTH*** *considers the role of seagrass meadows as nurseries for young fish, the vulnerability of this special habitat and some steps to conserve it.*

Seagrasses are among the very few flowering plants adapted to live in the sea. Though called seagrasses, those occurring round Wales are not grasses but belong in the Zosteracea. Like terrestrial plants they have roots, a vascular system for transporting gases and nutrients, and produce seeds. Their rhizomes spread below the sediment surface, and can form extensive clonal patches which coalesce to create distinctive seagrass meadow habitats. Despite losses and degradation, these interesting and productive meadows are still present in a number of localities around the Welsh coast. Recent research has also shown the importance of seagrass beds as nurseries for the juveniles of some commercial fish.

Current taxonomic opinion considers there are just two *Zostera* species in our waters. The larger one, eelgrass *Z. marina* has two sufficiently differing growth forms such that they used to be classified as separate species. The larger form of *Z. marina* typically occurs at and below the low water spring tide level of fairly sheltered sandy bays, while the

angustifolia form is more often found where shallow pools lie on muddy shores after the tide has gone out. Dwarf eelgrass *Z. noltii* typically lives in the upper parts of intertidal flats where it is grazed by wildfowl. Due to their delicate nature most species of seagrass are limited to sheltered environments where they are protected from wave and storm damage.

Threats to seagrass in Wales

Conservative estimates suggest that globally at least 51,000km^2 of seagrass has been lost, with many remaining seagrass meadows in highly degraded states.[1] In the UK there are only a handful of studies with enough data to allow adequate quantitative extrapolation[2] but there are historical records of the presence and absence of seagrass in local floras, though some records probably derive from drifted specimens. Even so, it has been estimated that the UK has lost between 25% and 49% of its seagrass in the last 25 years. For Wales, a report by Quentin Kay[3] provides the best available analysis of historic data on distribution. Particular losses are thought to have occurred in Milford Haven and along the south Wales coast.

Estimates from across the geographical range of *Z. marina* show that it requires between 12 and 37% of the surface light in order for it to survive in the long term, so good water quality is essential. The maximum growing depth in UK waters is about 7m below the low water level of spring tides: any turbidity thus limits the depth range. Elevated nutrient levels can also result in smothering by masses of drifting macroalgae, and from microalgae growing on the fronds. As the integrity of the meadows depends on the rhizomes holding together sand and finer sediment, they are particularly susceptible to physical disturbance.

In south Wales the remaining seagrass in Milford Haven is at risk from poor water quality, and considerable disturbance occurred in one area when a jetty was reconstructed. Some dwarf eelgrass patches on intertidal flats, as at Angle, have at times been disturbed by shellfish harvesting. At Porthdinllaen in north Wales local impacts from boat moorings and vehicles driven across the shore are readily visible.

Conservation measures

Thankfully there are still some sites with healthy seagrass meadows in Wales (e.g. North Haven, Skomer), but most seagrass in Wales remains under a range of threats. Seagrass meadows are categorised as a habitat in decline in the OSPAR Region II (Greater North Sea – The North-East Atlantic). They are a sub-feature of subtidal sandbanks for designation of Special Areas of Conservation under the European Habitats Directive. Some of the intertidal seagrass beds in Wales are located within Sites of Special Scientific Interest, such as Beddmanarch–Cymyran, which covers the strait between Holy Island and the rest of Anglesey. This site includes the Inland Sea between the causeways, which has very extensive areas where the two *Zostera* species occur. It is also one of only two places in Wales where spiral tassle-weed *Ruppis cirrhosa*, which has similarities to the seagrasses, has been recorded in recent decades. Some seagrass sites happen to be within Local Nature Reserves which were declared mainly for birds. So far in Wales, only the Skomer seagrass bed, lying within the only Marine Nature Reserve in the country, has special measures to protect it in the form of a prohibited anchoring zone. It now comes within the first Marine Conservation Zone in Welsh waters.

The importance of seagrass meadows

Seagrass meadows are of intrinsic scientific and natural history interest and are a highly valued part of the marine ecosystem. Photosynthesis levels are

C Bertelli

The Greater Pipefish (*Syngnathus acus* Pibell fôr fawr) is commonly observed in seagrass meadows throughout the UK

high and the meadows provide considerable structural diversity to the habitat, filtering water and allowing a wide range of other species to prosper on and amongst the fronds as well as in the stabilised sediment. Out of proportion to their extent they are valuable nursery grounds for juvenile fish. The benefits that seagrass meadows provide to the human population are termed 'ecosystem services'.[4] The majority of these ecosystem services can be generically applied to seagrass meadows globally, though these will vary locally and depend upon the health of the meadow and the specific seagrass plant species present. An unhealthy seagrass meadow, for example, may have less dense shoots and as such provide less available habitat for associated fish species. In Wales, specific services investigated to date include their role as fish nursery grounds, support for enhanced biodiversity and the provision of cultural services (eg fishing, tourism).

Since 2012 a SEACAMS research project has aimed at a greater understanding of the value of seagrass for fish communities, with particular emphasis on the extensive seagrass meadows at Porthdinllaen as nurseries for juvenile fish. Several targeted sampling methods have been used including a beach seine net, static fyke nets and Baited Remote Underwater Video (BRUV) systems. These allowed comparisons at small scales with immediately adjacent bare sand, as well as at different times of day. The BRUV equipment has been used at sites in Tremadog Bay and at Skomer.

Commercial fish species recorded to use seagrass meadows in Wales as nursery habitat	
Atlantic cod	*Gadus morhua*
Pollock	*Pollachius pollachius*
Saithe	*Pollachius virens*
Bib/Pouting	*Trisopterus luscus*
Whiting	*Merlangius merlangus*
Plaice	*Pleuronectes platessa*
Brill	*Scophthalmus rhombus*
Herring	*Clupea hurengus*
Mullet	*Chelon labrosus*
Bass	*Dicentrarchus labrax*
Dogfish	*Scyliorhinus canicula*

To date 42 species of fish have been recorded at Porthdinllaen, of which 35 were recorded in the seagrass meadow and 22 recorded on the sand adjacent to it. The most abundant of these were plaice *Pleuronectes platessa*, sea scorpion *Taurulus bubalis* and the fifteen-spined stickleback *Spinachia spinachia*. Eleven commercially important fish species have been found as juveniles in Welsh seagrass meadows (see box) with a further three species of shellfish. Fish density was on average 1.9 times higher amongst the seagrass than on the sand (seagrass 26.7 $\pm$ 2.4 fish per sample, sand 14.2 $\pm$ 3.0 fish per sample). Such higher densities in seagrass relative to adjacent non-vegetated habitat is consistent with data from throughout the whole

C Bertelli

Beach seine netting at Porthdinllaen in order to more fully understand the fish nursery function of these extensive meadows

R Lilley

Volunteers monitoring seagrass at Porthdinllaen as part of Project Seagrass

range of *Z. marina*. This is because seagrasses provide shelter from predators and an abundance of small crustaceans as food. The effect is that the young fish grow faster and have a higher chance of survival.[5]

Community initiatives

Seagrass meadows are one of the parts of the marine environment where awareness of their vulnerability through public engagement can make a real difference. In shallow water at low tide, 'Snorkle Safaris' have been run through them, while monitoring the extent and health of the Skomer bed has regularly been carried out by volunteer divers. A group of students and scientists at Swansea and Cardiff Universities have recently set up a small charitable organisation called 'Project Seagrass', with the aim of promoting the conservation and restoration of seagrass meadows. Activities to date have involved setting up an intertidal seagrass monitoring programme at Porthdinllaen and running some education sessions. Citizen science and wider public engagement are key ways to put seagrass conservation up the agenda.

***Dr Richard Unsworth** is a research officer in the SEACAMS project at Swansea University and an international expert in the ecology and conservation of seagrass.*

References

1. Orth, R.J. et al. (2006) A global crisis for seagrass ecosystems. *BioScience*, 56:987-996.
2. Foden, J. & Brazier, D.P. (2007) Angiosperms (seagrass) within the EU water framework directive: A UK perspective. *Marine Pollution Bulletin*., 55(1-6):181-195.
3. Kay, Q.O.N. (1998) A review of the existing state of knowledge of the ecology and distribution of seagrass beds around the coast of Wales. *CCW Science Report* 296.
4. Cullen-Unsworth, L.C.& Unsworth, R.K.F. (2013) Seagrass Meadows, Ecosystem Services, and Sustainability. *Environment*, 55(3):14-27.
5. Bertelli, C.M. & Unsworth. R.K.F. (2014) Protecting the hand that feeds us: Seagrass (*Zostera marina*) serves as commercial juvenile fish habitat. *Marine Pollution Bulletin*, 83(2):425–429.

Frogfish Photography

Fifteen-spined Stickleback (*Spinachia spinachia* Crothell bymtheg-pigyn) in subtidal seagrass

Dolydd Morwellt

Mae morwellt yn un o'r ychydig blanhigion blodeuol sydd wedi addasu ar gyfer byw yn y môr. Fel planhigion y tir mae ganddynt wreiddiau, system fasgwlar ar gyfer trosglwyddo nwyon a maetholion, a chynhyrchu hadau. Mae eu rhisomau yn lledaenu dan wyneb y gwaddod, gan ffurfio dolydd morwellt nodedig sy'n feithrinfa hanfodol i sawl rhywogaeth o bysgod ifanc. Mae morwellt wedi eu colli ac wedi dirywio rhywfaint o amgylch Cymru, yn arbennig ar arfordir y de, ond mae'n dal yn bosibl canfod y dolydd mewn sawl ardal. Wrth iddynt dyfu mewn dyfroedd cymharol fas a fflatiau rhynglanwol cânt eu difrodi gan angorfeydd cychod a cherbydau. Maent hefyd yn dioddef pan fydd llai o oleuni o ganlyniad i ddŵr cymylog a lefelau uwch o faetholion. Mae rhai safleoedd eisoes o fewn ardaloedd a warchodir, ond mae angen gwneud mwy i'w diogelu.

All photos: Mal Ingham

Seeing in the dark - *the value of camera traps*

Spying on wildlife - a trail camera attached to a tree

Many of our mammals are quite difficult to observe in the field, and it is often easier to look for their droppings and footprints. MAL INGHAM has installed nine trail cameras in the vicinity of his garden and tells us about what he is able to watch, including badgers, otters, polecats and one new arrival – a Reeves' muntjac.

Having spent some 30 years working in conservation and wildlife rehabilitation, it was second nature to ensure that when we moved into our new home in Denbighshire we were surrounded by wildlife, and with a large wildlife-friendly garden bordered by woodland there was certainly a wide diversity of species to keep us occupied.

From the conservatory we were able to watch an array of birdlife taking advantage of our well-stocked feeders, and when darkness descended we switched on the outdoor lights and watched badgers visiting the garden for their nightly treat of peanuts. But were they attracted to the garden for peanuts, or was the garden already part and parcel of their territory with the peanuts an added bonus? With well defined badger paths running throughout the garden and woodland, plus the occasional appearance of latrines, the answer was yes, the garden was in fact jointly owned by us and the badgers.

Every now and again our nightly slumber would be disturbed by

Family of badgers by the sett (*Meles meles* Mochyn daear)

A juvenile otter eating fish at the water's edge (*Lutra lutra* Dyfrgi)

Family of polecats on the drive (*Mustela putorius* Ffwlbart)

badgers squabbling and occasionally we would be wakened by more serious altercations as badgers from separate social groups encountered one other and a territorial dispute ensued, with horrendous growls, snarls and screams that made the hair on the back of your neck stand up. If you didn't know what it was you could be forgiven for thinking that the wood was alive with screaming banshees!

Eventually, in order to give us a better idea of who was who and from where, we began to monitor and map the various sett locations and carried out a bait-marking survey using food-grade plastic coloured pellets in order to determine the range of the groups. By checking the latrines for the deposited coloured pellets a few days later, we were able to form a good idea of what was going on. This helped to confirm that we did indeed have two separate groups (clans) with overlapping territories, hence the occasional disputes.

All this was very interesting and whetted the appetite for more; watching them happily munching away on peanuts was fine, but ideally we wanted to capture them on video carrying out their normal nocturnal activities, not just in the garden but in the surrounding woodland and beyond.

Installing our first camera trap

To achieve this we decided to purchase a trail camera which was capable of capturing daytime and night-time images, in either still or video mode, utilising the camera's infra-red capabilities. Four years ago it was a relatively easy task to decide which make and model of camera to purchase. Bushnell was leading the market in trail camera technology, with television programmes such as Springwatch using their Trophy model to capture footage of elusive nocturnal animals.

And so with the attitude of 'if it's good enough for the BBC, it's good enough for us' we purchased a Bushnell Trophy Cam, Model 119456 offering still image quality up to 5 megapixels and video resolution up to 720 x 480 pixels plus other various combinations. The camera delivered everything we wanted from it, resulting in us getting some very interesting nocturnal video footage of badgers playing, fighting, feeding and generally just socialising. This included some dramatic footage of three cubs giving off high-pitched whickering sounds of fear while being attacked by a member of a rival clan; we had seen the same cubs romping around and playing a few nights before. The following night they were caught on camera again and it was evident that one in particular appeared injured and in pain as it limped around whimpering in distress. The following night it vanished only to be found dead two days later in our section of woodland, having sustained a badly injured back leg and bite wounds around its rear end.

Not just badgers

Eventually we progressed from concentrating on capturing the everyday life of badgers onto a family of foxes, plus all the other species that passed by. These included grey squirrel, rabbit, stoat and weasel, together with a variety of bird life such as a tawny owl pouncing on a wood mouse and a buzzard having an early morning bath in the garden pond. The camera also proved very useful in providing photographic evidence of willow tits visiting the garden bird feeders on a daily basis. It not only recorded them visually on video, but also vocally as they perched by the feeders giving off their distinctive call. Hearing the calls enabled the county recorder to confirm that they were indeed the willow tit *Parus montanu* (a species in serious decline) and not the very similar marsh tit *Parus palustris*. This

Reeves's muntjac

Otter under the bridge

A solitary mink under the bridge (*Mustela vison* Minc)

validation allowed the record to be added to the database at Cofnod (the North Wales Local Records Centre). Eventually we bought two more cameras of the same model and situated them in various parts of the garden and woodland, resulting in even more interesting footage of animals just going about their daily or nightly business.

Choosing and using a camera

Two years on and it was decided to buy even more cameras and once again I turned to Bushnell, but to my surprise they had discontinued my old favourite, the Trophy Cam. 119456 and replaced it with a confusing array of different models including the top of the range Nature View HD Max model with two interchangeable close focus lenses. I field-tested a couple of the newer Bushnell models with mixed results: some gave very impressive high resolution daytime footage but with disappointing night-time footage. The top of the range Nature View HD Max 119440, with its high resolution image quality and close-up lenses, proved impressive in all aspects with the exception of grainy night-time images.

All of the HD Max models are quite large in comparison to the cheaper cameras but they do have a colour viewing screen and black LEDs (useful when used as a security camera). I eventually discovered, however, that red-glowing LEDs don't alarm the animals at all. They may sometimes shy away initially, but very quickly become used to them. All my cameras are now regularly given the once-over by various species resulting in a sequence of extreme close-up shots of nose, whiskers, bulging eyes, very loud sniffing noises and severe camera wobble! For the moment at least I have settled on a camera that gives good, consistent all-round results, the Bushnell Trophy Cam. HD 119547, costing around £160. The lack of a viewing screen could

Family of badgers coming through the wood

cause a problem when setting up in a new location. I deal with this by setting it up in single shot mode, and then wandering around the general area I want to focus on. Once it has taken a couple of shots, I insert the camera's SD card into a small Moultrie viewer (costing around £30), view the still images on a screen, and then adjust the camera's position as necessary.

Polecats and otters

I now have a total of nine cameras out in the field, which has extended the list of species recorded. In July 2014 I captured video footage of a family of polecats consisting of a jill (female) and her two kits coming out of the wood and onto the drive by the house. Also in 2014, a friend and neighbour had discovered otter tracks on the bank of a stream running through his land. Further explorations revealed more tracks plus fresh otter spraint, so we set up a camera. Within a short space of time we began to record an otter, and it soon became apparent that there were in fact two separate animals. By September the camera at this site had also recorded many other species, including badger, grey squirrel, wood mouse, bank vole, water shrew, brown rat, polecat, weasel, mink, heron, grey wagtail, dipper and a star-struck robin.

Daytime shots of muntjac deer in the woods (*Muntiacus reevesi* Carw mwntjac)

By this time we had come to the conclusion that our individual otters were a male and female but we had never seen them together, and then on the 12th December at 02.20, eureka!! There were three otters together, a female and her two cubs, swimming around in front of the camera and emitting their high-pitched whistling calls. Slowly but surely we are gaining more of an insight into the lives of this otter family, not only from following their tracks and spraints but also from analysing spraint in order to determine their food content. Coupled with the actual field work, the trail camera footage allows us to see what, under normal circumstances, would remain a mystery. We have footage of an otter eating a fish on the bank, of peeing and pooing in front of the camera, and their general comings and goings. They are very much at ease with the cameras, so much so in fact that they regularly give them a prod with their noses and a good sniffing, and I reckon it's only a matter of time before one of them decides that they make ideal territorial markers and actually deposits a spraint on top of one of them.

An unexpected visitor

Of course the presence of many of these species can be established without a camera, from visual observations and field signs. However, the cameras can also pick up scarce visitors we might never detect otherwise. For example, on 1st December 2014 a Reeves's muntjac deer triggered the camera as it passed quietly by and it (or another) appeared again a couple of weeks later, pausing in front of the camera to scent mark its path. This is the first proved record of muntjac in north-east Wales. Trail camera images of muntjac on the Welsh side of the Lower Wye Valley featured in the Winter edition of *Natur Cymru* (Issue 53, p49). So our camera traps are now providing important information for conservation, as well as fascinating images of local nocturnal wildlife.

***Mal Ingham** moved to the Vale of Clwyd after a career in countryside management, initially in the Forest of Bowland and then as Head Ranger/Wildlife Officer at Wirral Borough Council.*

Eu cipio ar gamera

Waeth faint o arsylwadau yn y maes y gellir eu gwneud yn ystod y dydd mae'n anochel fod gweithgareddau'r nos yn cael eu cuddio rhagom, a'u datgelu gan synau ac olion traed yn unig. Onibai, wrth gwrs, eich bod yn buddsoddi mewn camerâu trywydd is-goch. Dros y blynyddoedd mae Malcolm wedi gosod naw camera yn ei ardd fywyd gwyllt ef ac un ei gymydog, ac wedi cofnodi sawl rhywogaeth o famaliaid, yn cynnwyd dau dylwyth o foch daear yn cystadlu am eu tiriogaethau, teuluoedd o ffwlbartiaid, dyfrgwn a llwynogod, a gwenci, carlwm, llygoden goch a llygoden fawr frown. Llwyddodd hefyd i gipio titwod yr helyg, nid yn unig yn weledol ond drwy eu llais, a oedd yn goylgu adnabyddiaeth positif o'r rhywogaeth hwn sy'n dirywio'n enbyd. Ymwelydd arall annisgwyl oedd o leiaf un carw myntjac, y cofnod cyntaf ohono y gellir ei brofi yng ngogledd-ddwyrain Cymru.

©Geoff Wedge

Glow-worms and street lighting

Glow-worm *Lampyris noctiluca* Pryf tân

As if glow-worms don't have enough problems, street lights at one of their best locations in north Wales have been confusing males, which have mistaken the lights for females, leading to unrequited love for the males and a potential shortage of mates for the females. ANNE BUTLER fills in the background to what, thanks to a local champion and cooperation all round, has had a happy outcome.

After dark, during the months of June and July, male glow-worms fly weakly to the yellow/green light emitted by glowing females in order to mate and produce the next generation. However, on a part of the Great Orme near Llandudno, something different and rather less desirable has been happening. Many male glow-worms have been heading for the orange glow of the sodium streetlights, instead of to the glowing females who were waiting on the hillside. Before hearing the outcome of this worrying tale, a little information about the stars of the story.

What are glow-worms?

Glow-worms *Lampyris noctiluca* are beetles with a wide distribution in the UK. They spend two years as larvae, feeding on snails and slugs by injecting them with a paralysing fluid and then sucking up the contents. The adults do not feed during their short life-span of two to four weeks in June and July. After dark, the flightless adult female attracts the smaller male by emitting an intense yellow/green light from two

Jenni Cox

Anne Butler

Sodium lights glow orange and the light is dispersed

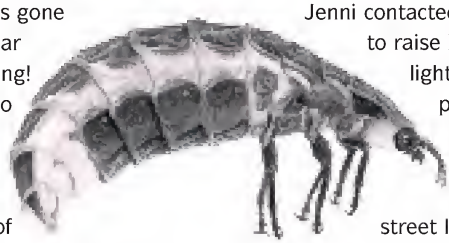
LED lights have proved less attractive to glow-worms

segments at the tip of her abdomen. The female will often crawl up a grass stem in order to be more visible to males when the light is emitted. The male is able to fly, rather weakly, towards the female. Once mating has occurred, the female goes underground to lay her eggs. She dies shortly afterwards.

The setting for this tale

The glow-worms in our story live on the Great Orme, a steep-sided limestone headland near Llandudno in North Wales. It is home to many rare species and important habitats and receives legal protection as a Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) to reflect the importance of its natural treasures. Much of the Great Orme is managed by Conwy County Borough Council as a Country Park, and the North Wales Wildlife Trust (NWWT) has a reserve on the side overlooking Conwy Bay.

The glow-worms remain unseen by most of those who come to the Great Orme as they only glow after dark, which means being there about 11pm when even the keenest of Wardens has gone home, and well after the cable car and trams have stopped operating! Only those intrepid enough to go on late night walks or those on special glow-worm events will have experienced the mid-summer spectacle of hundreds of bright yellow/green lights shining from the hillside. Walks led by the Council and NWWT have proved popular in recent years.



Nicholas Carter

The glow-worm habitat is fairly extensive across the south-western flank of the hillside and much of it is well away from street lights. However, there is a road which runs along the bottom of the hillside right around the headland, with street lights along a section of this road being directly below glow-worm habitat.

Raising the alarm

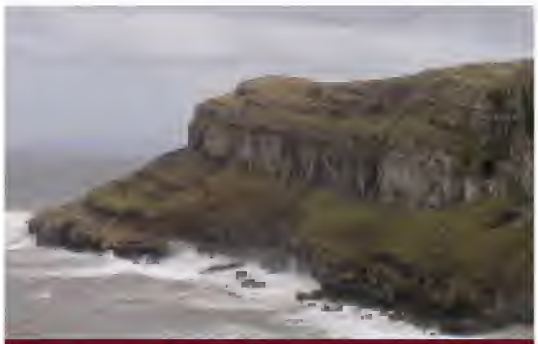
Until recently no-one had fully appreciated the considerable size of the population of glow-worms that lived on the Orme. More information became available when a very committed local resident, Jenni Cox, single-handedly started carrying out nightly counts. In one night alone she counted 581 glowing females. Worryingly, she also discovered that many male glow-worms seemed to be floundering on the ground underneath the street lights, apparently attracted to the street lights instead of the females.

Jenni contacted Conwy County Borough Council to raise her concern about the effect the lights might have on the glow-worm population. The Council's biodiversity team looked for guidance or research that would indicate which types of street lamps are less attractive to glow-

worms. It turns out that long wavelengths in the green/orange part of the spectrum (presumably closer to that emitted by the female glow-worm) were attractive to male glow-worms, but adding shorter wavelengths in the blue and ultraviolet range inhibited this attraction[1]. Perhaps replacing the existing orange sodium vapour (SOX) lights with white/blue LED lights would solve the problem? The Council's street lighting department agreed to help take things further.

Testing the hypothesis

The fittings for the existing SOX lamps deliver light with very little directional control, which resulted in wasted light shining up onto the Great Orme hillside. The fittings for LED lights, on the other hand, produce minimal light spillage upwards. Thus changing to LED lights should help by both provision of a less attractive light, and less light spillage. To test this, some street lamps along the stretch of road retained their original SOX lamps with high light dispersal, some lamps were fitted with white LED lights with directional light fittings, and some of the lights were switched off. As a further refinement, the pattern of street light types was changed halfway through the summer.



Conwy County Borough Council

Great Orme headland: the narrow road can be seen under the cliff

Not forgetting the moths

The Great Orme has important populations of rare moths, which are reflected in the SSSI designation for the site. Three of these occur in the vicinity of the street-lit area: the silky wave moth *Idaea dilutaria*, the dwarf cream wave moth *Idaea fuscovenosa* and the cliff case-bearer *Coleophora serpylletorum*. The silky wave moth, which has only been recorded in the UK from the Great Orme, the South Gower coast and the Avon Gorge, is a day-flier so could only be potentially affected by the street lights at dusk. Both wave moths belong to the Geometridae, which are now thought to be attracted as much to short wavelength light as to long wavelengths[2], so the LED lights are not likely to be more attractive to them. The third species, the cliff case-bearer, is only found in one very small location on the cliff-face of the Orme. Its inability to disperse meant that it would be highly unlikely to fly towards the street lights. After discussions with Julian Thompson, the local moth recorder, and Adrian Fowles, the Senior Invertebrate Ecologist for Natural Resources Wales, it was concluded that a

Anne Butler

Grassy slopes favoured by the glow-worms

Rhian Bek

A male glow worm at the foot of a lamp post

change to LED lighting would be unlikely to impact negatively on any of the rare moths. The LED lights used also had very low or negligible ultra-violet light content which is known to be particularly attractive to many other species of moths. In fact the LED lamp fittings, because they disperse much less light, should prove less attractive to moths.

Monitoring the results

In order to monitor the effect of the different street light fittings in summer, Rhian Bek, a keen student on placement with the Council, carried out night-time surveys underneath the street lights under the guidance of Jenni Cox. They found no males underneath the new LED street lights, nor underneath the lights turned off. This was in contrast with the tens of glow-worms found underneath the old sodium lights. The results suggested that the LED lights were no more attractive to male glow-worms than having no light there at all. The street lighting department have now replaced all of the old sodium lamps along the road with the higher wavelength, more directional LED lights.

A happy ending

So this is a happy ending for the glow-worms of the Great Orme where the street lights will no longer distract the males away from the females. These findings will hopefully be of use to others seeking to minimise the impact of street lights on glow-worms.

***Anne Butler** is the Biodiversity Officer for Conwy County Borough Council. She has been in the post for seven years and previously worked for the Countryside Council for Wales. She would like to thank Jenni Cox, Rhian Bek and Dorina Gerrard without whom this work would not have been possible.*

Further Reading

For a highly informative read all about glow-worms it would be well worth visiting Robin Scagell's website www.glowworms.org.uk. Robin also collates glow-worm records from all over the United Kingdom via his blog. Another resource is John Tyler's book *The Glow-worm* and his website www.johntyler.co.uk.

1. Booth, D., Stewart, A. J. A. and Osorio, D., 2004. *Colour vision in the glow-worm* Lampyris noctiluca (L.) *Coleoptera: Lampyridae*): evidence for a green-blue chromatic mechanism. The Journal of Experimental Biology 207, 2373 – 2378.
2. Somers-Yeates, R., Hodgson, D., McGregor, P.K., Spalding, A., Ffrench-Constant, R.H., (2013) *Shedding light on moths: shorter wavelengths attract noctuids more than geometrids*, The Royal Society Publishing, Biology Letters, DOI: 10.1098/rsbl.2013.0376

Pryfed tân

Chwilod yw pryfed tân (*Lampyris noctiluca*) sydd wedi eu dosbarthu yn eang yn y DU ac mae un boblogaeth yn byw mewn ardaloedd a ddiogelir ar Ben y Gogarth yng Ngogledd Cymru. Mae'r chwilod yn treulio dwy flynedd fel larfâu nes byddant yn barod i baru. Mae'r golau melynwyrdd llachar nodweddiadol yn cael ei allyrru gan y fenyw er mwyn denu gwryw, ar ôl iddi dywyllu ym mis Mehefin a Gorffennaf. Mae Jenni Cox, sy'n byw yn Ileol, wedi bod yn cyfrif y chwilod ac wedi canfod fod llawer o'r gwrywod yn ymgasglu ar waelod lampau stryd, gan fod y golau mae'n debyg wedi eu drysu. Lampau anwedd sodiwm oren yw goleuadau stryd traddodiadol ac mae'r golau yn tasgu allan i bob cyfeiriad. Mae lampau LED yn allyrru goleuni llawer mwy glas/gwyn, ac yn cyfyngu ar y goleuni sy'n cael ei golli ar i fyny. Llwyddodd profion i ddangos nad oedd y gwrywod yn cael eu denu gan y goleuadau LED, ac mae Cyngor Bwrdeistref Sirol Conwy wedi newid pob golau stryd yn yr ardal.

Green **Bookshelf**

Ospreys in Wales – the First Ten Years
Written and published by Emyr Evans, 2014
Hardback
£30
252pages

In 2004 word was getting around there were ospreys in Wales. Now this landmark event in the history of the Welsh environment has been recorded in a beautifully illustrated book by Emyr Evans, with foreword by Iolo Williams. The early historic records and Welsh names for ospreys are open to interpretation but it is agreed that they must have been widespread. Their return is truly celebrated in this account.

The photographs taken by Andy Rouse and Emyr Evans are the outstanding feature of the book. The large coffee-table format works well, with digital and strips of CCTV images reproduced to full page or page width. Some of them are breathtaking: beads of water fly from an osprey struggling to lift a fish from the water; a recognisable panorama of mountains and water unravels across the bottom of two pages; crystal clear and piercing orange osprey eyes peer from the page. The few out of focus images convey the strain to record a particular event, such as a first fledging or an important leg ring. 'Ceulan' the wet, cold, hungry chick, looks prehistoric. The egg shells are works of art.

When I visited the Glaslyn Osprey Project at Pont Croesor, I was impressed by the level of involvement and support from the local community, something which Emyr set out to achieve from the start. Volunteers helped to protect the site around the clock, while school children collected sticks for the nest and local fishermen helped to record the birds' diet. This book provides an opportunity for both the local community and key individuals to take a well deserved bow for their commitment and exceptional effort to protect 'their' ospreys. The account of the hugs and kisses exchanged in a small caravan when the first Glaslyn chicks hatched is hilarious. The drama of the first hatching on the Dyfi unfolded live on camera and was celebrated with champagne. However, the text does not skimp on describing the challenge of meeting marketing, new technology and media demands. The nest cameras went on to record new osprey behaviours and species interactions in HD, while bird migration was tracked using satellite tags.

The book starts with the historical and ecological context, which implicates DDT and the Catholic Church in the decline of the osprey. Emyr's detailed descriptions of bird behaviour are what you would expect from a behavioural ecologist, but are easily accessible and often funny. I learned about 're-directed behaviour' and 'fixed action patterns'.

The book recounts the highs and lows of our Welsh Ospreys on the Glaslyn and the second nesting site on the Dyfi, with individual chapters for each year from 2004 to 2014. At Glaslyn the birds had conservative IDs based on their ring numbers. However, when Emyr began to work at Dyfi the full reality soap opera developed, with supporting performances from Nora, Ceulan, Dai Dot, Deri, Glesni, Seren and others.

Throughout the book there is lots of suspense, drama and tragedy – sudden deaths, interlopers, odd couples, food monsters, grown men crying as eggs hatched, storms, flash floods and snow –and each development increased public interest and engagement. It is a wonderful and enjoyable read.

My only disappointment relates to the treatment of the ornithological data collected and presented in the chapter called 'Stats - Marmite'. The author was fearful that the statistics would not appeal to the reader, but the obvious trends and highlights in the data are explained. I wonder if there was not some other way that the science could have been interwoven with the story?

The concluding chapter is full of hope for the future, with 26 young ospreys reaching migration age but yet to return to breed in Wales, although the Glaslyn pair had Scottish grand chicks. The near final picture in the book shows two children, the first visitors to the impressive 360 Observatory, posed against the Dyfi wetlands – a very suitable photographic finale.

This book would be an excellent present for anyone who loves birds and the Welsh environment. As Emyr says, everyone remembers the first time they saw an osprey. But there are also useful lessons for anyone planning a conservation project. Go "Superospreys"!

Catherine Duigan

The Wales Coast Path – A Practical Guide for Walkers
Christopher Goddard & Katherine Evans
St David's Press
2014
Paperback 208 pages, £14.99

Wales was the first country in the world to have a dedicated footpath along its whole coast. The Wales Coast Path opened in 2012 and runs for 896 miles from Chester on the River Dee to Chepstow on the River Wye, including Ynys Môn. This book is the first pocket-sized guide to the whole length of the trail, divided into 73 day-length walks that range from 9-15 miles long.

This book is what it says in its title: a practical guide for walkers providing, through maps and text, instructions and commentary on the route and, most helpfully, information on public transport and accommodation for each section. This is important for walkers who wish to complete a length of the Wales Coast Path during the day and either stay locally or use public transport back to their starting point.

While the book describes the route in one direction (north to south) this does not prevent the book being equally useful if walking in the other direction. The maps are clear and attractively presented. The text is rich in detail, including information on the history of the coastal scenery being traversed as well as information on nature reserves and other features of natural and human interest.

Additional, alternative routes away from the Wales Coast Path are proposed in places, allowing walkers to see more of the local Welsh landscape.

The guide has a companion website www.walescoastpath.info which provides updates to the guide – especially important for changes and improvements to the Wales Coast Path route itself.

This is the best walking guide to one of the World's great coastlines and is highly recommended.

David Parker

Nature in Towns and Cities
David Goode
HarperCollins
2014
418 pages
Hardback £44.10
Paperback £26.99

David Goode was one of the first ecologists to recognise the importance of urban ecology, both in its own right and to the people who live in our towns and cities. His career-long experience from the 1960s to the present day makes him uniquely placed to write this account. His book, number 127 in the inspirational *New Naturalist* series, is a fine read, well illustrated and full of case studies which illustrate the principles and practice of urban ecology.

The book starts with an overview of the main types of urban habitat including his introduction of the term 'encapsulated countryside' to describe fragments of rural habitats and landscapes which have survived in now urban locations. David Goode's approach seeks to break down distinctions between urban and rural nature, but also identifies those habitats that are distinctly urban. Inevitably there is a focus on London where he spent most of his working life, but he does draw on examples from across the country.

The second part of the book looks at those species which have adapted well and prospered in the urban environment. There is a focus on birds, such as the story of peregrines which have moved most successfully into our towns and cities. In contrast, the account of the recent decline of the formerly abundant house sparrow in London shows that we cannot afford to be complacent about the future survival of even our most common species. There is an excellent chapter on urban foxes and badgers, where the research on these well-studied mammals captures beautifully the link between wild species and the man-made built environment.

There follows a comprehensive account of the development and practice of urban nature conservation, starting with its origins in the 1950s, its expansion in the 1980s and to the present time where an ecological approach to urban planning and design is becoming mainstream. David Goode brings these chapters alive through his personal knowledge of many of the key people involved in making these radical changes. It is clear that they were driven not only by the intrinsic value of nature but also by its importance to human physical and mental well being.

The strong connections between urban citizens and the wildlife in

their communities, parks and gardens is a constant theme in the book. This public understanding is a powerful driver to see better urban planning, not only in our present urban areas but also in how we design the future expansion of our towns and cities. I would have liked to see a little more in the closing chapter on how David Goode would advise that we harness all these positive developments to make urban planning for people and nature an irreversible, positive force for good in the future. However, this is a small criticism of an excellent book that will be the major source of reference on urban ecology for many years to come. Do read it.

David Parker

Rust Fungus Red Data List and Census Catalogue for Wales
Ray G. Woods, R. Nigel Stringer, Debbie A. Evans and Arthur O. Chater.
A.O. Chater 2015
Paperback 96 pages

This substantial piece of work on an important but somewhat obscure branch of biodiversity includes an exceptional photographic display of rusts on their host plants. Copies can be obtained from Ray Woods at Ty Mawr Mill, Builth Wells, Powys LD2 3SH, or you can view online at **http://www.aber.ac.uk**

Britain's Habitats
Sophie Lake, Durwyn Liley, Robert Still & Andy Swash
Princeton University Press, Woodstock 2014
Hardback £27.95, 275 pages

Lavishly illustrated and with the sub-title *A Guide to the Wildlife Habitats of Britain and Ireland,* this is a book which every subscriber to *Natur Cymru* must have on their shelves. Although described as a field guide, it is too large for the pocket and perhaps too heavy for the rucksack, unless you have strong shoulders, but *Britain's Habitats* most certainly deserves a place in the car.

There are almost 700 colour photographs. These, together with the numerous maps and text, describe all the main habitat groups found in Britain and Ireland. Ten in all: woodlands, scrub, heathlands, grasslands, mountains, rocky habitats, wetlands, freshwaters, coastal habitats and other habitats, these latter being arable, brownfield and traditional orchards.

Each section commences with an overview introduction. This begins with origins, followed by types, threats and issues, cultural importance, conservation importance and protection, key elements and finally further information.

Then follows the habitat types, 73 in all. Each has an introduction followed by sections on similar habitats, origin and development, conservation, how to recognise, when to visit, what to look for and, what I thought was rather splendid, a few lines under the heading *Did you Know?* One of the many examples which caught my eye concerned scree. A word which I learned comes from the Old Norse term for landslide, *skrioa*.

The aim of this stunning book is to help visitors to the countryside recognise the habitats around them, and understand how they have evolved and what makes them special. Every page is a delight, for both the informative text and the photographs. I am not sure I will take my copy into the countryside but it will always be close by at home.

David Saunders

Threatened Arable Plants in Wales / Planhigion tir âr dan fygythiad yng Nghymru

To try and get more people looking at our arable flora, Plantlife has produced a handy A5 booklet available in both English and Welsh. Copies can be obtained from the publications section on **www.plantlife.org.uk**, by contacting the Wales Office on 02920 376193, or by emailing cymru@plantlife.org.uk

See Colin Cheesman's article on page 45 for more discussion of arable plants.

Wales' forgotten flora – arable weeds!

Given the choice of ambling over the sand dunes at Kenfig, surveying the limestone cliffs of the Great Orme, delving into the oakwoods of Meirionnydd, or looking for plants growing at the field margins of an arable field, then few botanists, let alone lay naturalists, would opt for the last. And therein lies part of the problem with Wales's forgotten flora, the rather harshly named 'weeds' of arable land. It's simply not an attractive proposition at first sight.

Wales has an enviable arable flora and many of the species found here are both extremely rare and not without their own unique attractiveness. But these populations are in rapid decline with the increasing conversion of former arable land to pasture to accommodate an ever growing population of sheep and cattle now numbering nearly 11 million animals.

A comparison of L. Dudley Stamp's land utilisation survey, conducted during the 1930s, and the Countryside Council for Wales Phase 1 survey, completed in 1991, shows that there has been a 65% reduction in the area of agricultural land under arable cultivation. Only 9.9% of farmland now remains as arable land, equivalent to 162,000 hectares, but even that has changed in context and cultivation. The increasing use of fertilisers and herbicides, and a trend towards intensification of arable cultivation in larger farm units, has decimated the flora formerly found under arable crops. Changes from spring to winter ploughing have affected spring-germinating species such as night-flowering catchfly *Silene noctiflora*, corn mint *Mentha arvensis*, and field pepperwort *Lepidium campestre*.

Many of our distinctive arable plants have thus been pushed to the edge of extinction. A classic example is the corn buttercup *Ranunculus arvensis*, now restricted to two sites in Glamorgan where it is threatened with final extinction by development. It was once widespread in Monmouthshire, Cardiganshire, Flintshire, Denbighshire, Radnorshire and Montgomeryshire. In the UK it has declined dramatically since the 1940s due to its susceptibility to broad-spectrum herbicides and the application of nitrogen.

For a few of our arable flora Wales is something of a hotspot, where populations are healthier than in England. Take for instance small-flowering catchfly *Silene gallica*, which has strong populations in Pembrokeshire, Cardiganshire and on the Gower peninsula. It was widespread throughout England and Wales in the past, especially in the south, but its inability to compete with other species and with crops boosted by applications of nitrogen has meant a rapid decline. It is also highly intolerant of cold temperatures and this, coupled with a preference for sandy and sandy-loam soils, means it is increasingly found in coastal districts.

There is a close relationship between soil types and the occurrence of many arable plants. Corn marigold *Glebionis segetum*, for example, shows a distinct coastal distribution in Wales due to its close association with sandy and sandy-loam soils. In Victorian times it was a serious weed, but since the 1930s it has become much reduced due to improved seed cleaning, applications of lime, the use of herbicides and a shift to autumn-sown crops.

Cath Shelswell, Plantlife

Corn marigolds *Glebionis segetum*
Melyn yr ŷd

There is also a growing issue of determining whether plants are naturally occurring arable natives or whether their presence is due to the increasing amount of seed distributed, often to encourage pollinators. These are often the more dramatic floral specimens such as corn chamomile *Anthemis arvensis*, and cornflower *Centaurea cyanus* which, amongst others, have adorned our roundabouts and verges in recent years. Corn chamomile is now thought to be only truly native in Glamorgan whilst cornflower is more widespread, occurring in five vice-counties. Cornflower has declined through improved seed cleaning, whilst both species are susceptible to herbicides.

Colin Cheesman
Plantlife Cymru Programme Manager

See page 44 for Plantlife's booklet on arable plants.

Plantlife would like to acknowledge support received from Natural Resources Wales, and the invaluable assistance of volunteer County Recorders in Wales from the Botanical Society of Britain and Ireland.

Afon Elwy – caring for a river

People who don't live in St Asaph – Llanelwy in Welsh – may think that its crowning glory is the cathedral on top of the hill, the smallest medieval cathedral in the UK. Many of those who do live here, however, believe its crowning glory is the riverside.

St Asaph lies between two rivers, the Elwy and the Clwyd, which join, as the Clwyd, about a mile downstream of the city at a place called Pwll y Ddau Ddwr (Pool of the Two Waters). For some the city will always be associated with Bishop William Morgan, who was partly responsible for translating the Bible into Welsh in the 16th century; and for others with the North Wales International Music Festival held here each Autumn. But in 2012 our community made national news as a result of the devastating flooding of the Afon Elwy in November.

The Elwy and the Clwyd are totally different rivers: the Elwy is quick to rise, bringing water from a steep area of hard rock covered with boulder clay that extends nearly to Llanrwst in the Conwy valley, while much of the Clwyd catchment area comprises soft, porous rock which soaks up the rain. Its floodwaters are therefore much slower to rise and can linger for days: it is a relatively sluggish river, carrying sand and silt rather than gravel.

D I Rees

Floods on the Afon Elwy in 2012

Afon Elwy Environmental Group

Following a letter from Keep Wales Tidy to St Asaph Town Council in 2002, when I happened to be mayor, a number of interested people decided to form a group to protect the banks of the Elwy, sheltering the wildlife and creating an attractive amenity for residents and visitors, and thus benefiting the local economy. Balancing these two needs of protecting and encouraging wildlife and ensuring greater access for the public has not always been easy.

Action plan

For the past five or six years we have produced a development plan which we review and revise annually. It is a useful reminder of what we have achieved, as the long list of works completed includes some large items, such as the construction of a permanent footpath from Pont Begard to the medical centre, and Elwy Bridge, which cost over £22,000.

The Elwy once supported a mill at the bottom of Mill Street but the weir upstream of the city has now collapsed and the mill race has largely been infilled. The collapse of the weir led to major changes in the flow of the river where it meandered to an overall width of 60m compared with its normal 20m. By re-forming a smoothly curving channel and planting willow cuttings along the banks, the river has been persuaded to settle down in this reach.

Black poplars

Our most notable asset is our wonderful stand of black poplars *Populus nigra*. Remarkably there are still over 100 of these trees in the Vale of Clwyd and its tributary valleys, with a similar number in the combined areas of Flintshire and Wrexham. North-east Wales is home to about 10% of the UK population, and the St. Asaph trees on Roe Plas are believed to be some of the finest specimens to be found anywhere in Britain. Their characteristic features are the distinct lean, arching branches (from which the crucks for house-building were made) and striking red or green catkins (sometimes called devil's fingers) in the spring. A propagation programme is taking place in Ruthin, and some of the new trees have been planted in Roe Plas as part of our projects.

Mike Hughes

The distinctive crucks of Black poplar *Populus nigra* Poplysen ddu

Not everything has worked out well. The native bluebell bulbs and wild flower seeds that we planted have not flowered, even though we had a top layer of grass removed. We need to look at this again and have been advised that we probably need to buy bluebells in the green and get wild flower plugs.

The damaging floods of 2012 took one fishing/viewing platform totally out of the water and deposited it about 15m downstream, complete with the concrete beds that the uprights were set in. The recently constructed and planted butterfly garden was also lifted from its original position, though the movement was minimal, and picnic areas and benches were damaged. However, this small amount of disruption pales into insignificance compared to the losses incurred by hundreds of residents. Natural Resources Wales is currently consulting with all stakeholders regarding various options it has drawn up to try and prevent similar flooding in the future.

D I Rees

Afon Elwy

Life goes on

We have roughly 20 members in the group but, like many other organisations, we find it hard to get new members, especially younger ones, although we do work with local schools on specific projects. It's not just the physical work: we also need help to publicise what we do. We are all local people and we try hard to attract more people from the community to take an interest and appreciate their local environment. As well as articles in the local community paper and a display in the library, we've also used the local outreach youth service, and Colwyn Bay Canoe Club has helped in a river-clean once a year.

We hope to carry on with the good work: we have the usual maintenance work to do and still hope to complete the other tasks on the action plan, especially the completion of the footpath on the east bank. We have accomplished a lot in the last ten years, and also received two awards along the way, with a Tidy Towns Award in the Clean Rivers section in Margam Park in November 2007 and a Green Pennant Award in 2010.

It's rare not to see anyone walking by the riverside. We hope that our local residents and visitors continue to enjoy the riverside and that the various interpretation boards that we erected, together with the booklet that we've produced, help them appreciate this small area of the natural world around them.

The Group is grateful for support received from Keep Wales Tidy, St Asaph Town Council, Denbighshire County Council Countryside Services, Forestry Commission, Welsh Government, Environment Agency Wales and Cadwyn Clwyd.

David Iorwerth Roberts *was Chair of Afon Environmental Group for its first ten years and continues to be an active member.*

It's all in the mind – changing perceptions of how the land should look

As are contractors and consultants, managing land for biodiversity and recreation, we pride ourselves on low-impact working on sensitive sites. Although much of our heavier work is during the winter, with scrub control and small woodland work, we are also busy during the spring and summer with invasive species and meadows.

One of the most exciting things about this time of year is the amazing growth of wild flowering plants. Research has shown that spending time outdoors is good for us, not only through the benefits of physical activity, but also in the effects of green space on our state of mind and our mental health, and there's no doubt that spirits are raised standing in a field full of wild flowers.

Some people do feel wild meadows can look untidy and uncared for. Much of our society expects to see land 'managed'. When an area is left for the benefit of biodiversity, even for short periods, it can appear to many people as neglected, which encourages feelings of disrespect and attracts unsociable behaviour such as fly tipping or burning.

To counteract this we cut paths through the meadow with our four-foot wide tractor, to give a more managed appearance and to encourage people to venture further. Regular cutting around the borders also gives a managed and cared-for appearance. In urban or well visited locations, explanatory signage improves understanding and can mean the difference between an uncut meadow rich in biodiversity and a more barren 'lawned' area.

Management

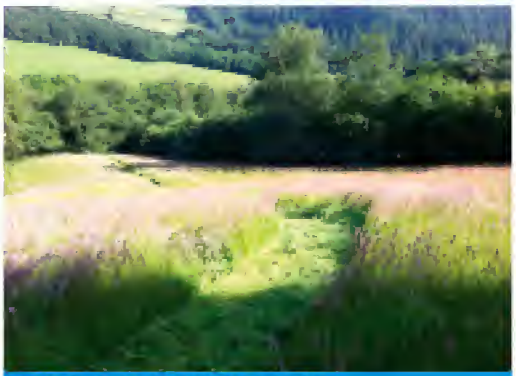
Meadows enjoying a late summer haycrop have the summer growth removed. Seeds are shaken out in the process, and are driven over by machinery and pressed into the soil, aiding germination the following spring. Aftermath grazing also helps, as more vegetation is removed and hooves also press seeds into the ground.

Not all meadows are so lucky, and there are many reasons why hay is not made, such as inclement weather, a crop with little value, and problems with access or the availability of machinery. For those left uncut or ungrazed, an ever increasing thatch of matted vegetation builds up, encouraging competitive weeds and enrichment of the soil, and delicate seedlings are smothered the following season.

It's our experience as conservation contractors that when it's not possible to remove the vegetation, then cutting with a flail is better than nothing. Our small flail chops up and spreads the vegetation, which breaks down sooner this way, and any future grazing will help disperse the material so there is less thatching. Nutrient enrichment is still an issue, but smothering is less so.

Cake and rake

On small sites we use our small tractor-mounted mower, where long cut material falls in rows and is raked off by hand to create a compost heap. There may be some run-off of nutrients from the heaps, so we choose locations carefully. The pile sinks rapidly by a half to two thirds within 6-8 months. Raking and dragging the material in builders' bags is hard work, but there is nothing more rewarding afterwards than the delights of a well deserved meadow picnic! Our friend Sarah has created the lovely social occasion of 'Cake and a Rake' – inviting enthusiastic friends to bring cake (and a rake!), following the mowing people, chatting as they rake, followed by guilt-free alfresco cake. The ultimate green gym! This can be stepped up a level on very small sites with the use of a strimmer or scythe (which of course justifies more cake).



An invitation to meander in a meadow

As contractors we are always looking at the next piece of kit we should be investing in, and have our eyes on a small cut-and-collect machine with which we'll further manage and enhance interesting sites in the future.

Ivy Denham
Conservation and Trees

Learning to love the surprisingly significant slug

There is no denying that the slug gets a bad press. Headlines such as "Slug alert! Invasion of the gastropods" and "Cannibal slugs invade Britain leaving a trail of slime in their wake" do little to endear us to this 'ghastly' gastropod.

As a woodland manager I am happy to wade through winter mud and sniff at various unidentified animal faeces to see if I can catch a whiff of jasmine tea (otter) or Parma Violets (pine marten). Yet even I have a twinge of revulsion when, picking my way through a damp, moss-covered oak wood, I steady myself on a tree only to gather a handful of intractable slime.

There is, however, no getting away from them. With a climate so favourable to these moisture-loving creatures, it seems inevitable that our paths will cross with increasing frequency. So, in 2015, I resolved that it was time to learn to love the slug. This led me on a quest to discover more about this not-so-common-or-garden creature. As it turns out, the slug plays an important role in the ecology of our woodland habitats (and is not all bad news in the veg patch either).

The slugs that we see are just a tiny fraction of the population: it is estimated that for every five slugs active above ground, another 95 lurk below the surface. In a cubic metre of ground there may be of 200 animals. Unlike snails they remain active all year round and may be encountered whenever temperatures climb above 5°C. Each can consume up to 40 times its own bodyweight in a single day and produce up to 90,000 grandchildren.

Four species are well known as pests, with a reputation for demolishing our crops and gardens. Some, like the leopard slug *Limax maximus*, avoid living plant matter, instead predating other slugs (and hence doing gardeners a favour). However, a large part of the diet of most British slugs comprises dead and decaying vegetation. As such they are an essential decomposer, cycling nutrients through the woodland ecosystem and improving soil fertility. Indeed, slug species diversity appears to be greater in woodlands than in open habitats.

There are at least 36 UK species, documented in the very helpful FSC publication *Slugs of Britain and Ireland*. Some are tricky to identify, requiring dissection or genetic analysis to confirm their identity. Concerns have been raised in recent years over 'invasions' of exotic slugs from elsewhere in Europe, for instance the so-called Spanish slug *Arion vulgaris*, first recorded in 2012 amidst fears that its hardy nature, large size and prolific breeding could result in displacement of native slugs and significant damage to crops such as oilseed rape.

Some slug species are woodland specialists: the ash-black slug *Limax cinereoniger* has a close association with old wood-pastures while a few, such as the lemon slug *Malacolimax tenellus*, are good indicators of ancient woodland, their presence suggesting significant habitat continuity. The lemon slug, one of the mycophagus (fungi-eating) slugs, is an attractive translucent yellow and can be spotted browsing large fungal fruiting bodies under mature trees in autumn.

Slugs also have important ecological relationships with other woodland species. Not just consumers of vegetation, it is now thought that they could play a vital role in distributing the spores of some of our rarest Atlantic lichens. Daughter colonies of the nationally scarce lichen *Heterodermia japonica* have been observed close to the probable parent, following slug browsing of the fruiting bodies. Spores or propagules pass through the gut with the symbiotic relationship between alga and fungus intact, and are then distributed and conveniently attached to suitable substrates such as hazel bark, through the slime trail that slugs use to navigate their way back to shelter. One good reason, perhaps, not to grimace when we inadvertently encounter a trail of slime when out and about in the woods?

Research also suggests that slugs limit the invasive tendencies of sycamore. They are a major grazer of the abundant seedlings and saplings, and thus help to check their dominance within the woodland tree community. Maple species seem particularly palatable to herbivorous invertebrates: the mature trees provide a good refuge from whence the slugs can make forays to devour the saplings beneath the canopy. So perhaps slugs also help to maintain Britain's woodland diversity.

Love it or hate it, the slug is a key part of our woodland ecology: useful, fascinating and sometimes even beautiful.

Kylie Jones Mattock

Yr Awydd i Losgi

Dros wyliau'r Pasg eleni cafwyd nifer syfrdanol o danau anghyfreithlon ledled Cymru, ac yn enwedig yng nghymoedd y de. Y cyfuniad o dywydd sych cynnes a'r llwyth uchel o danwydd rhedyn, eithin a gwair gwyn ar ffriddoedd a thiroedd uchel, ac ar hyd clogwyni arfordirol a rhostiroedd, oedd yn rhannol gyfrifol am hyn. Mae'r tanau anghyfreithlon hyn yn peryglu bywydau pobl, yn cynnwys y diffoddwyr tân, yn ogystal ag eiddo. Maen nhw hefyd yn cael effaith niweidiol iawn ar yr amgylchedd; gallant ddinistrio bywyd gwyllt a safleoedd hynafol, cynyddu llygredd ymledol, hagru'r dirwedd, achosi erydiad tir, creu argraff negyddol o'r gymuned leol a gallant hefyd amharu ar fynediad i ardaloedd hamdden. O'r môr i'r mynydd, y cynefinoedd hyn yw rhai o ardaloedd pwysicaf Cymru o ran bioamrywiaeth ond yn ogystal â hyn maent yn aml yn darparu cysylltiad ecolegol pwysig ar draws y dirwedd. Heb bori digonol mae'r ardaloedd yn troi'n gnwd unffurf o redyn ungoes, eithin neu wair gwyn sy'n llosgi'n hawdd yn ystod gwanwyn sych cyn bod y llystyfiant newydd yn egino. Dyma'r tanau mwyaf dinistriol, nid yn unig i'r planhigion eu hunain ond hefyd i'r holl bryfetach a'r anifeiliaid y maen nhw'n eu cynnal. Yn yr ucheldir gellid colli tymor nythu cyfan ac ar rosdiroedd gall lindys glöyn byw Britheg y Gors, sy'n gallu gwrthsefyll tanau ysgafn yn ystod y gaeaf, gael eu lladd gan beryglu'r boblogaeth-feta yn yr ardal. Ond y cynefinoedd mwyaf bregus yw'r mawndiroedd. Yn ystod cyfnodau sych gall tanau losgi'r mawn ei hun, gyda chanlyniadau catastroffig. Mae tanau mawn yn eithriadol o anodd i'w diffodd a gallant fudlosgi am ddyddiau, neu hyd yn oed wythnosau, gan ollwng carbon i'r amgylchedd tan ddaw'r glaw i'w diffodd. Unwaith i'r crystyn uchaf losgi mae'r mawn oddi tanodd yn fwy tebygol o erydu ac yn aml caiff ei chwythu neu'i olchi ffwrdd, gan arwain at ddiflaniad parhaol y cynefin.

Mae tanau gwyllt, yn enwedig yn rhai o gymunedau'r cymoedd, yn broblem flynyddol. Mae swyddogion tân a'r heddlu wedi bod yn gweithio gyda phlant ysgol, ac yn rhoi cyngor i rieni, er mwyn ceisio lleihau nifer y tanau. Er waethaf hyn fe barhaodd yr achosion eleni hyd nes i'r tywydd dorri. Un agwedd bositif ar y sefyllfa oedd ymateb pobl ifanc lleol ar wefannau cymdeithasol yn erbyn y llosgi anghyfrifol yma. Y bwriad nawr yw parhau i weithio drwy'r cyfryngau hyn i addysgu pobl ynglŷn â'r difrod sy'n cael ei achosi gan danau anghyfreithlon.

Teg yw dweud bod cyrff cadwraethol, yn hanesyddol, wedi lobïo yn erbyn llosgi fel ffordd o reoli safleoedd oherwydd y posibilr-wydd o ddinistrio cynefinoedd corsiog bregus ond erbyn hyn mae agweddau'n newid. Mae llosgi dan reolaeth yn ystod y gaeaf yn cael ei hybu fel un o'r ffyrdd i leihau'r risg o effeithiau tanau anghyfreithlon ac amddiffyn cynefinoedd rhag cael eu dinistrio. Erbyn hyn mae Llywodraeth Cymru'n cydnabod llosgi fel dull o reoli cynefinoedd yn yr ucheldir fel rhan o gynllun amaeth-amgylcheddol Glastir.

Mae nifer o sefydliadau a grwpiau cymunedol wedi dod ynghyd ar draws Cymru i ymchwilio dulliau o reoli safleoedd bregus a lleihau'r crynhoad o hen lystyfiant ac i ddysgu sut i gynyddu eu potensial ar gyfer bywyd gwyllt. Yn ogystal â rhedeg ymgyrchoedd addysgiadol o fewn cymunedau i geisio atal y tanau mae'r frigâd dân wedi bod yn darparu hyfforddiant er mwyn i ffermwyr a staff cadwraeth ddysgu sut i losgi mewn ffyrdd priodol a diogel. Darparwyd sesiwn yn ddiweddar ar y Mynydd Du, ar y cyd rhwng Parc Cenedlaethol Bannau Brycheiniog â'r Gwasanaeth Tân. Mynychodd dros 60 o bobl. Roedd mor boblogaidd nes y bu'n rhaid trefnu ail ddiwrnod o hyfforddiant. Rhoi sylw i digonol i lechyd a Diogelwch, yn ogystal â pharatoi trylwyr, oedd prif neges y cwrs. Dysgodd pawb am bwysigrwydd cynllun llosgi yn ogystal â phwysigrwydd trefnu a chael caniatâd gan awdurdodau perthnasol. Gwelwyd y gwahanol fathau o gyfarpar sydd ar gael i gynnau, rheoli ac os oes angen, i ddiffodd tanau, cyn symud ymlaen i sôn am y canllawiau sy'n rhaid eu dilyn cyn dechrau llosgi.

Roedd ardal i'w llosgi eisoes wedi ei marcio a bu'n rhaid mesur cyflymder a chyfeiriad y gwynt i sicrhau na fyddai'r tân yn chwythu allan o reolaeth ac hefyd i bennu lleoliad y stribyn byffer. Mae'n bwysig bod y stribyn yma ar hyd y ffîn bellaf, i lawr o'r gwynt, er mwyn atal y prif dân wrth iddo losgi tuag ato. Dim ond ar ôl creu byffer digonol y cafodd y prif dân ei gynnau. Ar ôl y llosgi archwiliodd pawb y safle a daeth yn amlwg bod y tân wedi croesi'r wyneb yn gyflym.

Yn wahanol i'r tanau gwyllt anghyfreithlon dim ond blaen y llystyfiant a losgwyd, gan adael gwaelod y planhigyn a'r pridd heb ei gyffwrdd.

Mae nifer o'r cyrsiau hyn eisoes wedi eu cynnal ar draws Cymru ac yn barod mae galw am gyrsiau tebyg y gaeaf nesaf. Yn dilyn y tanau anghyfreithlon a welwyd yn ystod y gwanwyn mae pawb yn cydnabod, erbyn hyn, bod rhaid cael gwell rheolaeth ar y cynefinoedd sydd wedi eu hesgeuluso.

Dim ond un arf rheolaeth yw llosgi. Rhaid cael rhywfaint o bori gyda gwartheg hefyd er mwyn cyflawni gwir botensial bioamrywiaeth y tir a losgwyd ac i leihau'r llwyth o danwydd llystyfiant. A dyma broblem arall. Gydag economeg cadw gwartheg bîff brodorol yn mynd yn anoddach a'r cyfyngiadau rheoli diciāu yn ei gwneud hi'n anoddach ac yn fwy costus i symud yr anifeiliaid mae dyfodol ein cynefinoedd amrywiol yn dal i fod yn y fantol.

Huw Williams
Arbenigwr Technegol Cadwraeth, Cyfoeth Naturiol Cymru

Burning desire

A combination of dry warm weather and a large fuel load of dry vegetation in the rural landscape led to an unprecedented number of deliberately started fires this Spring, especially in the South Wales valleys. These fires are a major risk to people and property, and have significant negative impacts on the environment including: biodiversity loss, increased diffuse pollution, soil erosion, loss of heritage sites, visual impacts, a negative perception of the local communities, and disrupting access to recreation sites.

The habitats affected are potentially the most biodiverse areas locally, and often provide essential connectivity routes through the landscape, but if left ungrazed they can become monocultures of bracken, gorse or purple moor-grass which are particularly vulnerable to burning in dry springs, before the fresh new growth emerges. Burns at this time are the most destructive: whole seasons of ground nesting birds could be lost, and marsh fritillary caterpillars, which can survive light, fast winter burns, would also be killed. On peatland sites the peat itself can often catch fire and remain smoldering, releasing carbon into the atmosphere for days or weeks. The exposed underlying peat is vulnerable to erosion, leading to the permanent loss of habitat.

These deliberate fires are an annual problem, though one positive response has been the reaction on social media groups, with young people in the affected communities speaking out against these reckless acts of vandalism.

Historically many conservation organizations have lobbied against burning, but controlled burning in winter is now promoted as one method of reducing the impacts from wildfires and protecting vulnerable plant communities. The Fire Service has run community education campaigns, and training courses for farmers, conservation staff and volunteers which have been well attended. One such course attracted over 60 people and proved so popular that a second training day had to be arranged. Attendees learned about the importance of formalizing an agreed burning plan, and were shown the types of equipment available to light, manage and extinguish a fire, and the checks that are necessary on any site prior to burning.

The agreed area to be burned had been marked out beforehand. The wind speed and direction were checked to ensure the fire wouldn't blow out of control, and this influenced the location of the control buffer strip which must lie downwind of the furthest boundary, acting as a natural stop for the flames. Burning took place only after the strip was established. Afterwards it was clear that, unlike fires in dry conditions, the fire had quickly travelled across the surface vegetation, leaving the damp lower part of the plants and soil untouched.

Burning is only one tool: grazing with cattle would reduce the annual build-up of dry, combustible vegetation and would maximize the biodiversity potential. However, the economics of keeping hardy beef cattle, coupled with restrictions on their movements due to TB, means the future of our most diverse habitats remain precariously vulnerable.

Huw Williams
Conservation Technical Specialist, Natural Resources Wales

Marine matters

Toothed top-shells *Monodonta (Osilinus) lineata* Top môr danheddog

This year marks the bicentenary of the birth of Edward Forbes (1815–1854), a remarkable marine biologist and polymath. Born on the Isle of Man, he took a particular interest in the Irish Sea and made some important finds off the Welsh coast, providing the first written record of the beds of horse mussels off Pen Llŷn. Among other things, Forbes drew attention to the way marine species can be grouped by the biogeographic provinces they occupy. In particular he noted several species which reached the northern limits of their distribution on or near the south-western shores of England, Wales and Ireland. With climate change, these are just the sorts of species whose ranges are worth keeping a check on.

One such species is a large heavy-shelled bivalve mollusc, *Callista chione*, the brown Venus. Forbes even drew a map showing where he thought its northern limit lay in the south Irish Sea. Though based on rather slender evidence, as he never saw it live himself, he was not far off the mark. *Callista* shells have been known from Cardigan and Caernarfon Bays at least since Victorian times, but it was not until 2001 that a small localised living population was found in Cardigan Bay by a Bangor University team which was studying another large bivalve, *Arctica islandica*. Mysteriously, there are no records of *Callista*, even as shells, in the gap between south-west Wales and the Scilly Isles.

Another mollusc with a south-western distribution is *Monodonta (Osilinus) lineata*, the toothed top-shell. It used to reach the south-west side of Anglesey but, being susceptible to cold winters, was lost from here after the severe frosts of 1962/63. It survived in reduced numbers south of Llŷn, and more than two decades elapsed before it re-colonised the former range. Since then it has spread further round the north Wales coast to some Liverpool Bay shores and, by the west coast of Ireland route, has spread into the North Irish Sea through the North Channel.

Population changes of some barnacles are also expected in response to climate change. An easy one to spot, having a red conical shell, is *Perforatus (Balanus) perforatus*. This has long been known to occur on Pembrokeshire shores, south of St David's Head. In the south of England in recent decades it has spread eastwards from Devon and Cornwall up the Channel as far as Sussex, so similar range extensions ought to occur in Wales. For a while it has been predicted to make the jump from Pembrokeshire to Pen Llŷn. Bets are on as to where or when it will first be found on a rocky shore in north Wales – occasional finds attached to drifting plastic fish boxes and other marine litter do not really count.

Edward Forbes' father was a banker, so as a young man he had independent resources to pursue his marine studies. A bank crash put an end to this but he then supplemented a meagre income from university posts by writing several of the classic Victorian era works on starfish, marine molluscs and medusae. Among the delights to be found in natural history books of that time are the engravings which enliven the text. Some of these even add a leavening of humour.

Forbes was friendly with a Liverpool ship owner and fruit importer, Robert MacAndrew (1802-1873). The two men undertook dredging expeditions together on the MacAndrew yacht, which was equipped for scientific work, and they produced several joint publications. Where are the equivalent 21st century backers of natural history such as MacAndrew or Charles Rothschild? Marine natural history in the widest sense obviously makes use of spin-offs from investments in technologies, such as sonar and underwater imaging, for exploiting resources. Impact assessment work in recent decades has also spun off fundamental knowledge. Nevertheless, a trend can be detected in which more resources now appear to be put into public relations and computer graphics than the environmental science needed to fully understand the pros and cons of developments.

Is it legitimate to ask if there are wealthy individuals or private companies sufficiently interested in natural history who will allow better fundamental understanding of the seabed, to make up for declining state support? We may no longer have wealthy patrons of marine and other branches of natural history as in Victorian times, but we do have veritable armies of citizen scientists. To fully realise the value of their observations inevitably requires paid organisational support, and this seems to be declining.

Ivor Rees

Partneriaeth Bioamrywiaeth Cymru
Wales Biodiversity Partnership

DYDDIADAU CALENDR NATUR 2015

Digwyddiadau

4-12 Gorffennaf: Wythnos Genedlaethol Gwas y Neidr
18 Gorffennaf - 9 Awst: Y Cyfrifiad Gloÿnnod Byw
25 Gorffennaf - 2 Awst: Wythnos Genedlaethol Gwynio Morfilod a Dofffiniaid
17-23 Awst: Wythnos Forol Môn
29-30 Awst: Noson Ystlumod Ryngwladol
9-10 Medi: Cynhadledd Partneriaeth Bioamrywiaeth Cymru
10-12 Medi: Noson Wyfynod Genedlaethol
18-20 Medi: Ymgyrch Glanhau'r Traethau
23 Medi - 23 Hydref: Tymor Hel Hadau

NATURE'S CALENDAR 2015

Events

4-12 July: National Dragonfly Week
18 July - 9 August: Big Butterfly Count
25 July - 2 August: National Whale and Dolphin Watch
17-23 August: Anglesey Marine Week
29-30 August: - International Bat Night
9-10 September: Wales Biodiversity Partnership Conference
10-12 September: National Moth Night
18-20 September: Beachwatch
23 September - 23 October: Seed Gathering Season

Cyrsiau Dysgu Gydol Oes
Lifelong Learning Courses

Cyrsiau Ecoleg Maes a Chadwraeth
Professional Development Courses
Field & Conservation Ecology

INTENSIVE 3DAY COURSES

	Start Date
Denmark Farm Conservation Centre, Lampeter	
Understanding British Mammals	12-06-15
Identifying Flowering Plants	26-06-15
Identifying Grasses, Sedges and Rushes	29-06-15
Understanding British Mammals 2	03-07-15
Invertebrate Macro Photography	10-07-15
Centre for Alternative Technology, Machynlleth	
Introduction to Forest Gardening	13-06-15
Wildlife Digital Photography	26-06-15
Identifying Flowering Plants	03-07-15
Identifying Grasses, Sedges and Rushes	06-07-15
Plant Diversity	25-09-15
Pantglas Centre, Llandewi Brefi	
Introduction to Permaculture	03-07-15
Marine Wildlife Centre, New Quay	
Understanding British Marine Mammals	17-07-15
National Trust Centre, Stackpole	
Wildlife Digital Photography	18-09-15

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